RAILROAD GAZETTE

FRIDAY, DECEMBER 31, 1897.

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Contributions.

Acceleration Formulae.

PHILADELPHIA, Dec. 27, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your article on Acceleration Tests (page 911) is exceedingly timely and calls attention to the tendency prevailing to confusion of ideas with regard to the fundamental laws of motion. As the use of formulæ in connection with movement of trains is increasing, it is especially timely to place engineers on their guard against using short empirical formulæ without investigating their derivation. I hope that you will extend your discussion of this subject, and give us the benefit of a real mathematical treatment of the matter from a practical standpoint.

B. W.

[The table published last week in connection with the article on "Recent Acceleration Tests" contained two or three typographical errors which, while not vital, are somewhat misleading. We reprint the table below, and in making the correction have added a column giving the observed speeds as published in our issue of Oct. 1, and have at the same time made the results in columns 3 and 4 correspond with the observed velocities as here given.

Time in seconds.	Observed speed, miles per hour	Dist. in feet. Const. accel. formula.	Dist. in feet. Parke's formula.
5	19	70	84
10	30	219	268
15	35	385	506
20	38	557	776
25	40½	824	1,070

—EDITOR RAILROAD GAZETTE.]

To Reverse or Not?

TO THE EDITOR OF THE RAILROAD GAZETTE:

Reports of railroad accidents, such as collisions and these which are caused by obstructions on the track, are frequently supplemented with the statement that the engineman, when he noticed the impending danger, applied the brakes and reversed his engine. In cases where the enginemen have not survived to tell their tale, the wrecked engines have generally been found with the brake valve in the emergency position and the reversing lever in the back motion. In most such cases the engineman has probably reversed automatically, much as a man throws up his arm to ward off a blow. As your hand pulls the reins when your horse shies or stumbles, so the hand of the engineer seeks the throttle and the brake-valve without being guided by thought. It is natural and involuntary for the old engineers, who learned their trade before the advent of the continuous brake, to pull back the reversing lever. To stop them from doing this would be to request them to think before they act in emergencies when every second counts, or it would be like asking the man at whose head a stone is thrown to think in what direction to dodge.

As a class locomotive engineers are men of intelligence capable of doing a great deal of thinking and reasoning, but when it comes to running their engines, they will, unless they are bent on experimenting a little when they have plenty of time on their hands, go through the manual like trained soldiers, without the least hesitation or thought. If the manual is changed, they must, like soldiers, be trained over again, but it is far easier to impress a new system on the raw material, than to first obliterate the training and habits of years, in order to prepare place for new teachings. This is a reason why the railroad companies should pay attention to educating their firemen, the coming engineers, in the approved and best modern practice, instead of leaving them to follow in the footsteps of the present generation of enginemen.

These thoughts have been brought out in consequence of a recent damage suit following upon an accident on a railroad whose enginemen have positive instructions not to reverse their engines in any emergencies. In this case the opposing counsel claimed negligence on the part of the company, contending that everything possible had not been done to stop the train, inasmuch as the engineer had not reversed the engine. This brings up the question whether or not an engine should be reversed in order to make a quick stop. The subject concerns, of course, only such locomotives as have properly designed driver brakes of a reliable pattern.

Very few railroads, it seems, have issued definite instructions on the subject. The men are allowed to handle their engines according to their own ideas, or rather as they saw the men, for whom they formerly fired, handle their engines. Before the evolution of the driver brake to its present form, the reverse lever was the only resource in times of danger, and the dependence on it has been taught from man to man down to the present day. The ambitious young engineman or fireman who wants to pry deeper into the knowledge and secrets of the craft is generally referred to Forney's "Catechism of the Locomotive," and Sinclair's "Locomotive Engine Running and Management." In the former the following order of procedure, when danger is perceived ahead, is laid down:

1. Shut the throttle valve.

2. If the train is equipped with hand brakes alone, blow the danger signal for their application, or if the train has a continuous brake, apply it with its full force.

3. Reverse the engine and open the throttle and the sand valves.

The author also explains that it is best not to reverse the engine until the train is somewhat checked, as there is always danger of breaking something when reversing at high speed.

The other book referred to gives exactly the same rules, with the special addition in case of non-air brake trains to let off the driver brake when the wheels begin to slide, and to open the cylinder cocks until they again revolve, after which the brakes should be applied again.

In a pamphlet accompanying the Instruction Book of the Westinghouse Air-Brake Co., the following paragraph is found: "Don't reverse your engine when the driver brakes are applied. If properly designed, they will give all the resistance to revolution the driving wheels will comfortably bear. Retardation of movement is less with sliding wheels than when revolving with brakes applied."

It will be noticed that this is contrary to the rules given by the first-named two authorities. The Association of Air Brake Men has, however, approved of the Westinghouse rule, by answering the question whether or not the engine should be reversed, as follows: "No. Even if it is a poor brake, the wheels will lock and slide, and sliding wheels will not hold as much as if they were revolving. If the driver brake holds at all the engine should not be reversed."

It may be said that the Westinghouse Air Brake Co., as well as the Air Brake Men's Association, are partial to their special instruments, which would explain their objections to the use of the reversing lever. At any rate, without definite instructions issued by the railroad companies, the engineman is left with good authority for either method, free to follow his own practice and inclination. Although many of the best locomotive runners acknowledge that they consider an efficient driver brake, cut in with the train brakes, the proper and most effective means of stopping a train, yet in times of danger, when the brakes are applied and the effect of them is not immediately felt, the suspicion that something may be out of order with "the air" will make them falter in their faith long enough to fall back on the reverse lever. An excellent and reliable passenger engineer, who the other day came into the roundhouse with flat spots on the tires of his big express express engine, replied, when interrogated by the road foreman of engines, that the brakes did not seem to take hold right when he was flagged, so he had to reverse the engine. He had plenty of air and the brakes were in first-class condition all through the train, but the few seconds which had elapsed after he had turned the handle over to "emergency" and until he pulled the reverse lever over seemed like minutes to him. The brakes probably began to do their work at the same time as he felt the engine labor in the reverse motion, and the train would undoubtedly have stopped as soon had he stood the strain and resisted the temptation a moment longer.

Many engineers claim, however, that the steam which remains in the dry pipe, steam pipes, passages and steam chests after the throttle is closed will have to be worked off somehow, and if the engine is not reversed the steam will drive the engine on for a few revolutions, against the resistance of the brakes; whereas, if the engine is reversed, this steam will furnish the necessary resistance to the piston from the first moment. If the engine is running with the throttle shut at the time a quick stop is to be made, there would certainly be nothing gained by reversing the engine, providing the driver brakes are what they should be. But where the engine is working under steam and the danger is great, involving life or much property, and if the engine can be reversed quickly, there is no reason why the lever should not be pulled back, at least for a few seconds, even at the risk of blowing out a cylinder head or causing other damage to machinery. At any rate, it will be difficult to make the men think otherwise, or if they do so, to act otherwise at the crucial moment. It is a legal question to what extent a railroad company could be held responsible if it omits to issue definite instructions on this subject to its men, and how far the men as competent agents of the company are personally responsible in lieu of instructions.

M. E.

Forces Acting on the Outside Rail.

BY F. T. HATCH,

Chief Engineer Terre Haute & Indianapolis Railroad.

Fig. 1 represents the outer rail of a 6-deg. curve without elevation. At any given speed, the ratio between the load and the centrifugal force will be the same for any load, and will be as $1 : \frac{v^2}{R \times g}$ when v is the velocity in feet per second, R the radius of the curve, and g the retardation in feet per second due to gravity. $v = 88$ ft. at a speed of 60 miles per hour. The radius of a 6-deg curve = 955.4 ft; $g = 32.2$.

$$\frac{v^2}{R \times g} = \frac{88^2}{955.4 \times 32.2} = \frac{7{,}744}{30{,}764} = .2517.$$

For each 100 lbs. load on the rail under consideration, or 200 lbs. on the track, the centrifugal force will then be $200 \times .2517$, or 50.34 lbs. We have then a horizontal force of 50.34 lbs. acting at a right angle to the axis of the rail near its top and tending to overturn it. Resisting the overturning tendency we have a vertical force of 100 lbs With a perfect wheel, resting on a perfect rail and supported by a perfect tie, the wheel and rail will have two points of contact; one at the center of the rail, and the other near its gage line. As shown on diagram, the vertical force is assumed to act upon the rail at a point midway between these two points of contact. The fulcrum about which the rail must turn to tip over is at A. The centrifugal force tending to overturn the rail acts with a leverage equal to the distance from its line of direction to A measured at a right angle to that line, or 4.92 in. The resisting force acts with a leverage equal to the distance from its line of direction to A, measured at a right angle to that line, or 2.86 in. The moment of the overturning force about the point A is 50.34×4.92, or 248 in.-lbs. The resisting moment of load is 100×2.86, or 286 in.-lbs., or more than the overturning moment even when resistance due to weight of rail and holding power of spikes are ignored.

The full amount of each of each of the above force acting on the rail is assumed to be effective on the rail, in computing the overturning and resisting moments at A and B. The theoretical reductions due to the oblique angles made by the lines of direction of some of the forces, with the surface of the rail at points of application, are largely overcome by friction, and are ignored. Any reduction which might be made for this cause would alter the centrifugal force in every case more than the force due to load. This assumption gives the greatest possible effect to the centrifugal force.

Should the top of the rail be worn flat, the center of bearing of a perfect tire on an upright rail would be nearer the center of the rail than shown in drawing. At the point A the leverage of the centrifugal force will be 4.94 in., and of the load 2.6 in. The overturning moment will be 256 in.-lbs. and the resisting moment 260 lbs.

Should the tire be so worn as to perfectly conform to shape of top of rail, its center of bearing will be at center of upright rail. At the point A the leverage of the centrifugal force will be about 4.92 in., and of the load 2.34 in. The overturning moment will be 248 in.-lbs. and the resisting moment 234 in.-lbs., and the rail will overturn. This condition gives the greatest possible effect to centrifugal force acting on an upright rail, but is unlikely to occur, as tire must be very badly worn to bring it about.

The dotted lines in Fig. 1 show the same rail as shown by the full line with its outer edge cut into the tie an inch. The opposite or inner rail is assumed to be upright. The inclined position of the load increases the force tending to overturn the rail. The increase due to this cause equals the weight of the load multiplied by the sine of its angle of inclination. This force acts, however, in the direction of its plane of inclination, and only its horizontal component is added to the centrifugal force, or the weight of the load multiplied by the tangent of its angle of inclination. The points of bearing of load on the opposite rails being 58.81 in. apart, and that on the outside rail being 0.56 in. lower than that on the inside rail, the additional overturning force due to the tipping of the outer rail will be

$$200 \times \frac{.56}{\sqrt{58.81^2 - .56^2}} = 1.9 \text{ lbs.}$$

The force tending to overturn the rail will then be $50.34 + 1.9 = 52.24$ lbs. The vertical force resisting this tendency is the same as in the case of the upright rail, 100 lbs. The fulcrum about which the rail must turn to tip over is, in this case, at B. The force tending to overturn the rail acts with a leverage of 5.43 in., and the force resisting this tendency with a leverage of 2.42 in. The moment of the overturning force about the point B is $52.24 \times 5.43 = 284$ in.-lbs. The resisting moment of the load is $100 \times 2.42 = 242$ in.-lbs. Unless prevented by

its own weight and the holding power of spikes, this rail will tip over.

Fig. 2 represents the outer rail of a 6-deg. curve elevated 6 in. above the inner rail. The load on the rail is taken, as in the cases already considered, at 100 lbs. The centrifugal force is directly opposed in this case by the horizontal component of the force set in action by the inclined position of the load, which equals the weight of the load multiplied by the tangent of its angle of inclination, or

$$200 \times \frac{6}{\sqrt{59.5^2 - 6^2}} = 20.27 \text{ lbs.}$$

The centrifugal force due to a speed of 60 miles per hour on a 6-deg. curve has already been found to be 50.34 lbs., and the force acting on the rail in this case will be 50.34 — 20.27 = 30.07. The fulcrum about which this rail must turn to tip over is at *C*. The force tending to overturn it acts with a leverage of 4.54 in., and the force resisting this tendency with a leverage of 3.36 in. The moment of the overturning force about the point *C* is 30.07 × 4.54 = 137 in.-lbs. The resisting moment

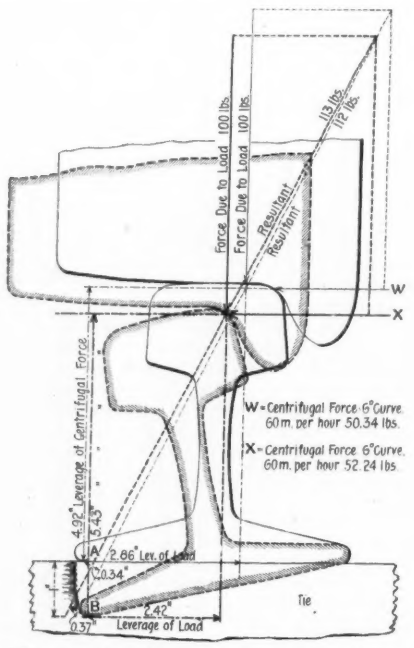


Fig. 1.—Outer Rail of Curve on Level Tie.

of the load is 100 × 3.36 = 336 in.-lbs., which is much more than the overturning moment.

Should the tire be so worn as to perfectly conform to shape of top of rail, its center of bearing may be at center of the rail when the rail is in the upright position, designated as position 1. At the point *C* the leverage of the centrifugal force will not be materially changed from that shown in the drawing, but the leverage of

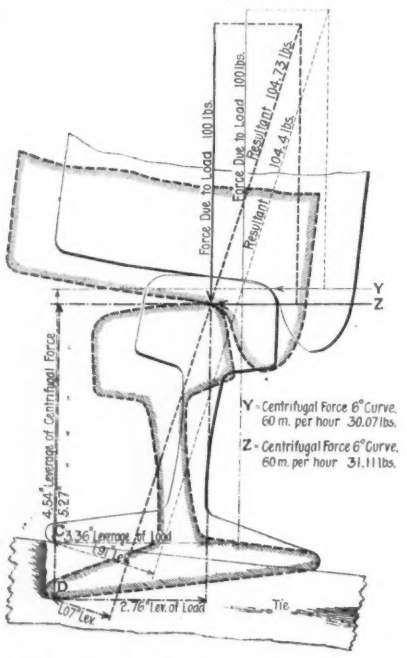


Fig. 2.—Outer Rail of Curve with Six Inches Elevation.

the load will be reduced to 2.82 in. The overturning moment will be 137 in.-lbs., and the resisting moment 282 in.-lbs. This condition will give the greatest possible effect to centrifugal force acting on a rail in this position.

The dotted position (designated as position 2) in Fig. 2 shows the same rail with its outer edge cut into the tie an inch. The inner rail is assumed to stand in its normal position. The cutting of the outer rail into the tie reduces its elevation above the inner rail to 5.63 in. The points of bearing of the load on opposite rails being 58.81 in. apart, the reduction of the overturning force will be

$$200 \times \frac{5.63}{\sqrt{58.81^2 - 5.63^2}} = 19.23 \text{ lbs.,}$$

and that force will be 50.34 — 19.23 = 31.11 lbs. The fulcrum about which this rail must turn to tip over is at *D*. The leverage of the overturning force is 5.27 in. and of the resisting force 2.76 in. The moment of the overturning force about the point *D* is 31.11 × 5.27 = 164 in. lbs. The resisting moment of the load is 100 × 2.76 = 276 in.-lbs. The resisting moment is still much greater than the overturning moment.

The same result will be arrived at in another way in each of the above cases, if the moment of the resultant of the two forces be taken instead of the moments of the separate forces. In position 1, Fig. 1, this moment is 112 × .34 = 38 in.-lbs. In position 2, Fig. 1, it is 113 × .37 = 42 in.-lbs. In position 1, Fig. 2, it is 104.4 × 1.91 = 199 in.-lbs. In position 2, Fig. 2, it is 104.73 × 1.07 = 112 in.-lbs. This moment is in each case equal to the difference between the moments of the separate forces, and in the direction of the greater.

Comparative Tests of Steam Injectors.

A series of comparative tests of eight different steam injectors was made by Mr. G. H. Trautmann in 1896 at the University of Wisconsin, and the results in full have recently been published in the *Bulletin* of that institution. The tests were made under the direction of Prof. Storm Bull. The injectors tested formed part of the equipment of the steam engineering laboratory and were considered only from the point of view of boiler feeders, in which case all injectors have an efficiency of nearly 100 per cent.

Briefly described the apparatus consisted of two wooden tanks, each having a capacity for about 2,400 lbs. of water, one of which was used as a feed water tank, and the other as a receiving tank. The injector to be tested was fastened to the side of the feed-water tank at about half its height. Both suction and delivery pipes, after being extended to the top of the tanks, branched off in opposite directions, one branch for each tank, and a three-way cock was placed at the T so that by regulating the cocks it was possible to feed from or discharge into either tank, or to feed from and discharge into the same tank, the latter case being convenient for heating the feed water. The suction pipe was provided with a gate valve for regulating the suction, and between this valve and the injector was placed a vacuum gage. The delivery pipe was also provided with a gate valve for regulating the discharge, and between this valve and the injector was placed a pressure gage which would register as high as 200 lbs. By means of these two valves the lift and discharge pressures were very readily regulated. The steam pipe was provided with a gate valve about a foot above the injector. By means of this valve the steam could be throttled to the pressure desired. Two steam pressure gages were placed in this pipe, one above and one below the throttle-valve. The steam used was furnished by boilers in the central heating plant of the University, and was conveyed to the apparatus by means of a 2-in. pipe, which was well covered with asbestos covering. This pipe was about 100 ft. long. A separator was placed in the steam pipe close to the apparatus, so that the steam was relieved of most of its moisture before entering the injector. Just opposite the lower steam gage a throttling calorimeter was inserted, and during each run readings were taken on this calorimeter. In order to measure the amount of water, the tanks were carefully calibrated. Each tank was provided with a glass water gage, placed over a graduated scale, extending from the bottom to the top. The scale was graduated so that readings could be taken to pounds.

The system adopted for the purpose of comparing the various injectors was as follows :

The steam pressure at the injector was always kept at a pressure of 80 lbs. by means of the throttle-valve. The lift was always kept constant at 8 in. of mercury by means of the valve in the suction pipe. The discharge pressures were kept at 20 lbs., 40, 60, 80, 100, 120, etc., to the limit, *i. e.*, at ¼, ½, ¾, 1, 1¼, etc., times the steam pressure at the injector. For each one of these pressures a run of a certain number of minutes was made, keeping all readings constant during the run. The temperatures of feed water were 50 deg., 70, 90, 110, 120 Fahr., etc., to the limit. For each change of feed-water temperature a complete series of tests was made, using the discharge pressures as given above. This made from 25 to 30 tests for each injector. Limits of action were also determined after each series of tests. In order to determine the limit of delivery, the pressure at the injector being kept constant at 80 lbs. and the vacuum gage at 8 in., the discharge pressure was slowly increased until the injector would "break," or stop working. The highest pressure was the limit of action for 80 lbs. boiler pressure and a lift of 8 in. of mercury for each temperature of feed water used. This series of limit tests was carried out for steam pressures at the injector of 80 lbs., 60, 40, 20, etc., to the lowest limit at which the injector would work.

Suction limit tests were also made for each change of feed water temperature. This was done by keeping the boiler pressure constant (always at 80 lbs.) and finding the limit of suction for the varying pressures of discharge, *i. e.*, at 20 lbs., 40, 60, 80, 100 lbs., etc.

During each run steam was kept flowing through the calorimeter, and after about half the test was over the readings for the calorimeter were taken. About four inches of water was kept in the separator. The water in the feed tank was raised to the proper temperature by using the injector as a heater. The water was thoroughly stirred up and brought to the correct temperature before starting each test. It required about a minute to start the injector and regulate the gages, and the readings for the test were not begun until all the gages were perfectly constant.

The following injectors were tested:

"Korting," made at Hanover, Germany; "Sellers," made by Wm. Sellers Co., Philadelphia; "World," made by the American Injector Co., Detroit. Mich.; "Sherwood," made by the Sherwood Injector Co., Buffalo, N.Y.; "Monitor," made by the Nathan Mfg. Co., New York; "Pemberthy," made by the Scott Valve Co., Chicago; "Excelsior," made by N. A. Watson, Erie, Pa.; "United States," made by the American Injector Co., Detroit, Mich.; "Metropolitan," made by the Hayden & Derby Mfg. Co., New York.

All of these injectors are of the lifting type. The Korting, World, Metropolitan and Sherwood are double tube, and the Monitor, Sellers, Pemberthy and United States are single tube injectors.

TABLE OF RESULTS.—INJECTOR TESTS.

Name.	Gal. per hour.	Temp. of feed, F.	Size of steam pipe, ins.	Av. water per lb. of steam, lbs.	Temp. of delivery, F.	Limit of suction, ins. of mercury.	Limit of feed temp, F.
Sellers	615	50	1¼	12.17	137	20.5	125
Sherwood	579	50	1	7.83	179	21.25	122
Metropolitan	615	50	1	11.07	144	17.75	118
Monitor	511	50	1	12.37	175	12.5	102
Korting	508	50	1¼	9.47	159	18.5	120
Pemberthy	478	50	¾	12.03	137	16.5	94
World	570	50	¾	9.22	160	19.5	130
Excelsior	286	50	¾	7.95	175	14.25	87

Steam pressure at injector, 80 lbs per square inch, by gage.

The curves in Fig. 1 are temperature curves, the feed-water temperatures being taken as ordinates and the delivery temperatures as abscissæ. This diagrams shows that the Sherwood injector heats the water to a higher temperature than any other, but the table of results

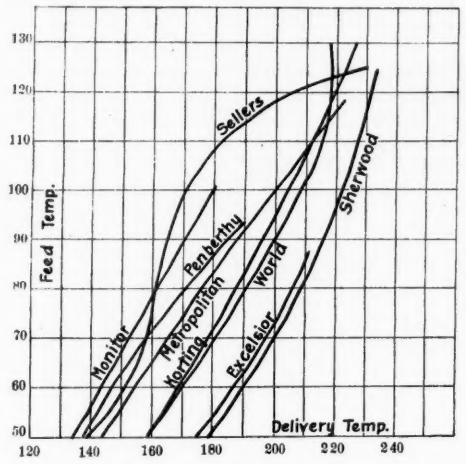


Fig. 1.—Temperature Curves—Injector Tests.

shows on the other hand that the number of pounds of water per pound of steam, 7.83, is much smaller than for the other injectors, as should be expected. This same table shows that the Monitor injector delivers the greatest number of pounds of water per pound of steam, 12.37, but in Fig. 1 it ranks last in heating capacity. The temperature curves of the World and Korting injectors are

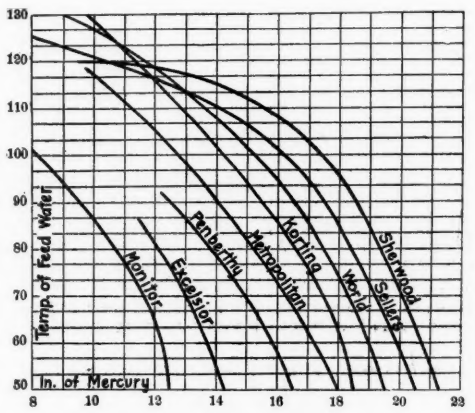


Fig. 2.—Suction Limit Curves.

nearly the same, and these injectors are a little above the average in heating capacity and are nearly up to the average in the number of pounds of water per pound of steam, the World being 9.22 and the Korting 9.47. Both rank higher than all the others in the range of

feed water temperature, being equal at the limit of 130 deg. The Sellers averages well; the limit of feed-water temperature is 125 deg., the number of pounds of water per pound of steam, 12.17, ranking second, but its heating capacity is quite low, ranking about sixth in Fig. 1.

The Metropolitan is fifth in rank in Fig. 1, being the lowest of the double-tube injectors for the limit of feed-water temperature, 118 deg., and next to the lowest in heating capacity. It ranks fourth in the number of pounds of water per pound of steam, being 11.07. Fig. 1 shows clearly that the double-tube injectors are best suited for hot water. The heating capacity of the single-tube injectors is much lower than that of those provided with double tubes.

Fig. 2 shows the order of the injectors in regard to highest suction limit, the Sherwood, double tube, injector being first, and the Monitor, single tube, last.

The Korting and Metropolitan injectors are the least affected by a change of the temperature of the feed water. The Sellers and World injectors vary quite a little, while the Sherwood injector changes considerably.

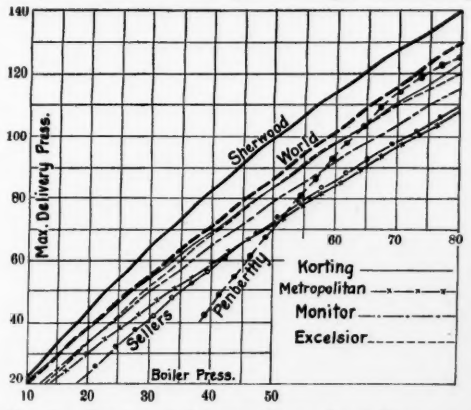


Fig. 3.—Results of Injector Tests—Feed Water at 50 Deg. F.

In Figs. 3 and 4 the maximum delivery pressures are plotted as ordinates with the boiler pressures as abscissæ to show the effect of changing the temperature of the feed water; Fig. 3 gives the results obtained with the lowest temperature tried, 50 deg, and Fig. 4 results at the highest temperature of feed water, 120 deg. F.

It is difficult to draw definite conclusions from these tests, since the injectors may be used under so many different conditions. Probably the most important property of an injector is its ability to use hot feed water, and next in importance is its lifting power. The other properties do not signify so much since the efficiencies are all nearly 100 per cent. Unfortunately the boilers at the University could not furnish steam at higher pressures than 80 lbs.,

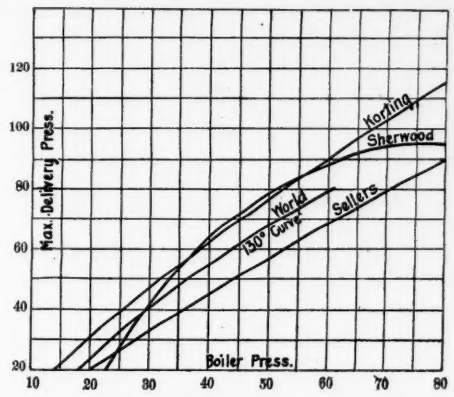


Fig. 4.—Results of Injector Tests—Feed Water at 120 Deg. F.

and it would have been desirable to have extended the tests to higher pressures. Prof. Storm Bull, however, states that there is no reason to doubt but that the results obtained for the higher pressures would show the same relative position of the various injectors, and that the curves representing the performance of the injectors may be continued far beyond the points at which the injectors were tested without committing any serious error.

Electric Railroad Progress in Great Britain.

It is well known that the United Kingdom has been exceedingly slow in the adoption of electricity as a motive power for its railroads and tramways. The causes of the delay have been many and various. Until the past 12 months the opposition from municipal governing bodies and the general public was very great and almost every new scheme was attacked most inconsistently by people who had never seen a trolley line in operation, but had only heard that the system possessed many objectionable features. This kind of opposition is fast dying out—in fact may almost be said to be extinct as regards most of the larger and more important centers. To overcome the unreasonableness which had got abroad has been a task of enormous proportions, and to pioneers in the electrical line it has been an arduous and despairing work.

In a great measure the feeling against the overhead trolley wire has been changed by municipalities sending deputations to various cities on the European continent and in one case to America, to report on the success which had attended its employment there. The expense, from the taxpayer's point of view, has been very considerable, but it is pleasing to note that the elaborate reports issued by deputations sent from Glasgow, Belfast, Sheffield, Bradford, Manchester and many other towns have had and are still having the desired effect.

Up to the present, electric tramway work in England really mean overhead trolley construction, for the conduit and accumulator are hardly in evidence anywhere. The only town where an underground conduit system has been employed for some years is Blackpool, and here the corporation has resolved to abandon the underground work and substitute the trolley wire, in expectation of increased efficiency and more economical working. At Blackpool the tramways run along the sea front and the underground conduits are sometimes filled with sand, which interferes with the working and prevents the cars running for many hours at a time, which of course means heavy loss of revenue.

Of the accumulator system, which has been tried over and over again at Birmingham with various types of accumulators, there is not much to be said. It is everywhere recognized that electric accumulator tramways can hardly be expected to accomplish much until some more efficient accumulator has been introduced. In view of the fact that many minds are at work on this problem in all civilized countries, there is promise of developments very shortly. There are surface contact and other systems being introduced by companies in England, but these have not made much headway. Whether they will do so or not remains to be seen.

A number of trolley wire lines are now working with great success in various English and Irish towns, and the number of lines constructing at the present moment shows that things are moving in that direction. The list of new schemes for which parliamentary powers are being sought during the forthcoming session of the British Parliament is a very long one. There is a strong movement in favor of municipalization of tramways now worked by companies, and where steps are being taken in this direction provision is made for working by electric power. Quite a number of important light electric railroad proposals are on foot, among them being the following: Bournemouth & Poole, 15 miles long, gage 3 ft. 6 in.; Bradford & Leeds, 5⅓ miles long, gage 4 ft. 5¼ in.; Brighton, 4¾ miles, gage 3 ft. 6 in.; Christchurch & Poole, 13¼ miles, gage 3 ft. 6 in.; Finchley & Hendon, nine miles, gage 3 ft. 6 in.; Folkestone & District, 15⅔ miles, gage 4 ft. 8½ in.; Hastings & St. Leonards, four miles, gage 3 ft. 6 in.; Kinver, four miles, gage 3 ft. 6 in.; Middleton (Lancs), 8¼ miles, gage 4 ft. 8½ in.; North Shields, Tynemouth, two miles, gage 3 ft.; Potteries extensions, four miles, gage 4 ft.; Rochester, Chatham, etc., 14½ miles, gage 4 ft. 8½ in.; Llanfair & Beaumaris, 6½ miles, gage 2 ft. 6 in.; Penarth & Cardiff, four miles, gage 4 ft. 8½ in.; Coatbridge & Airdrie, three miles, gage 3 ft. 6 in.

These are only the schemes connected with light railroads, many of which are merely tramways in the English sense. The provisional tramway orders are very numerous.

If all these works, or a fair proportion of them, are put in hand, there should be some very good electric tramway construction work ahead in England, and American houses are there already doing their level best to carry off some good contracts. So far they have succeeded better than one would have expected.

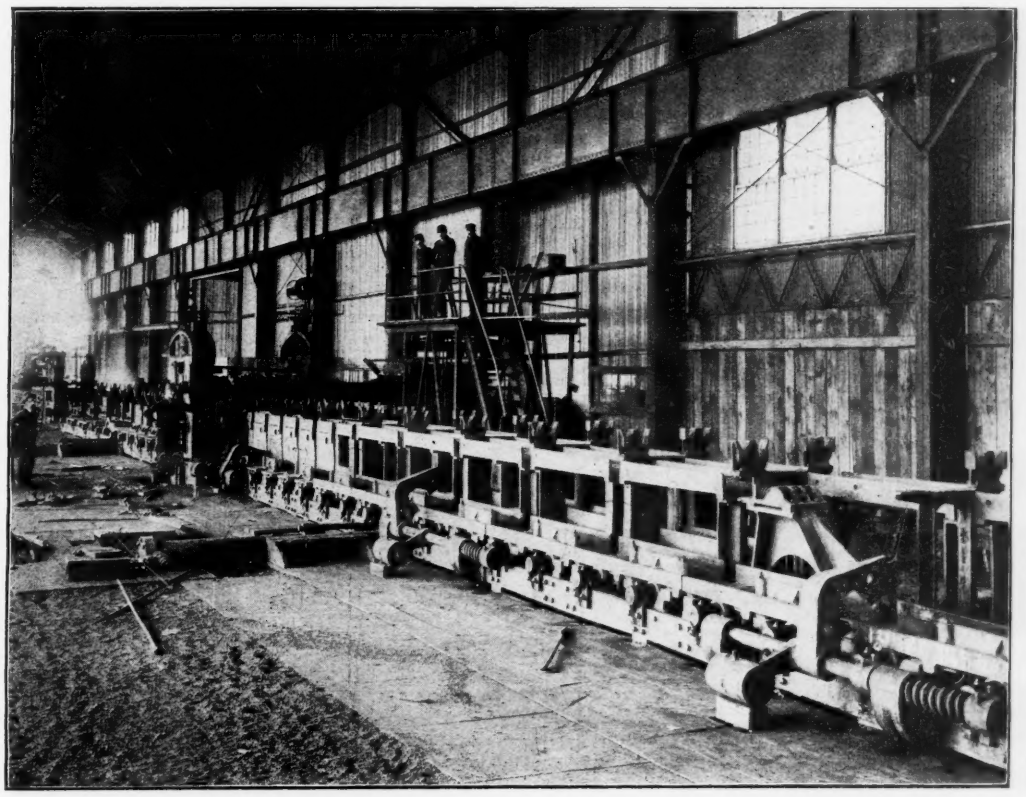
In underground electric railroad schemes, much is being done in London. One line is running, another is just on completion, and a third is well in hand. Other large schemes of a similar character are also proposed.

New Open-Hearth Plant of the Buhl Steel Co.

The new open-hearth plant of the Buhl Steel Co., at Sharon, Pa., producing billets, tin plate and sheet-plate bar, is of special interest as being a very recent example of modern mill construction and equipment. The first furnace was started in May and now the plant is running at full capacity, having met with remarkable success in operating the new machinery.

The buildings are of the usual steel framing covered with corrugated sheets. The mill building is 900 ft. × 50 ft., with lean-to additions on the west to enlarge the floor space where necessary. The boilers and gas producers occupy suitable buildings west of the mill and a neat and well-equipped chemical laboratory is adjacent to the mill on the north.

The process of manufacture begins at the north end of the mill, which is increased to 100 ft. in width by a lean-to 328 ft. × 50 ft. Here are placed six, 30-ton, basic open-hearth furnaces of the usual stationary type. Each furnace is connected with a stack 115 ft. high. Eighteen producers furnish the gas, which is admitted to the furnaces under sufficient pressure to completely fill the chambers with burning gases.



Sheet Bar and Tin Plate Bar Mill—Buhl Steel Co.

An electric charger built by the Wellman-Seaver Engineering Co., of Cleveland, charges the furnaces at the rear and a 50 ton Shaw electric traveling crane is provided for handling the pouring ladles over the casting pit in front of the furnaces. The ingots are bottom poured, usually 17 in. × 20 in., weighing 2 tons. South of the furnaces are three, four hole, soaking pits in which the ingots may be kept at rolling heat until they are sent to the blooming mill. Furnace and soaking pit doors are operated by hydraulic cylinders.

The ingots are taken from the casting pits or soaking pits to the blooming mill table by a Shaw electric crane of 20 tons capacity.

The rollers of the blooming mill table are actuated by bevel gears mounted on a shaft connected to a small double reversible engine. All "live" rollers in the tables throughout the mill are driven by steam in the same manner. The blooming mill is two-high, with 35-in. pinions, operated by a double reversible engine of Corliss type, with cylinders 36 in. × 48 in.

After passing the blooming mill a 37-in. hydraulic shear cuts the metal into lengths convenient for the bar mill, where it is rolled into tin-plate bar (8 in. wide by ⅛ in. to ⅜ in. thick), or sheet-plate bar (8 in. × ⅛ in. to ¾ in.). This mill is three-high, with 27-in. rolls, having five passes, two below and three above the middle roll. It is driven by a 3,000 H. P. Corliss engine. When the mill is on tin-plate bar all passes are frequently filled at one time. This is made possible by the special table designed by Mr. S. V. Huber, of Youngstown, O. The transfers in this table are operated by hydraulic power and transfer the bars from one pass to another by horizontal and vertical movements. The bars are given a finished surface at the finishing rolls, which are operated by a 1,000 H. P. Corliss engine, after which transfers slide the bars a few feet to a roll-table, which conveys

them to the shear, where they are cut into 30-ft. lengths. This shear is provided with a grip, in which the bar is caught, and pulled along until the proper length has been drawn through the shear. No hot or cold saws are used.

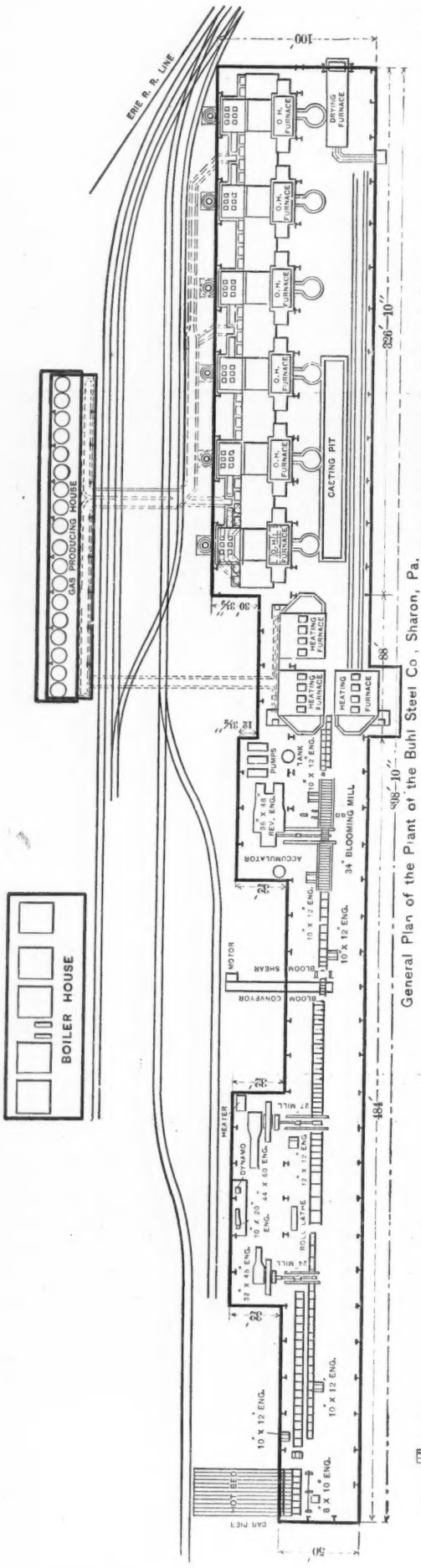
"Ducks" attached to cables passing around winding drums operated by a small double reversible engine slide the bars out upon the hot-bed, where they first fall into a pocket or bar piler. The pile is then lifted out by hydraulic transfer and shoved by the "ducks" further out upon the hot-bed, where the bars are left to cool.

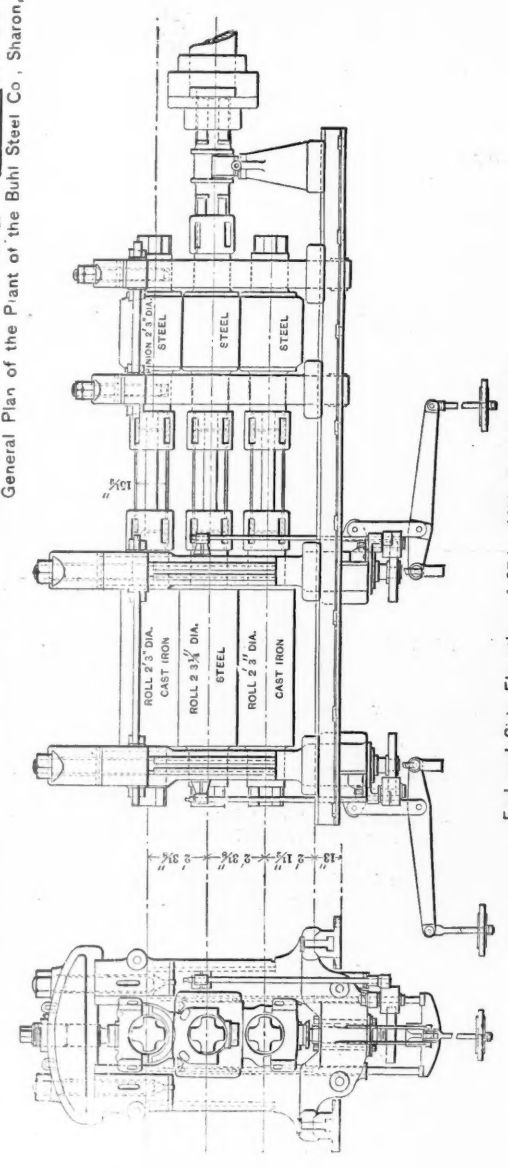
The electric plant delivering current to the charger, cranes and incandescent lamps consists of two 250-volt General Electric generators driven at 750 revolutions per minute; one generator being belted to a 15 H. P. horizontal engine built by the Southwark Foundry Co., speeded at 200 revolutions a minute; the other generator is belted to a 150 H. P. Westinghouse engine making 300 revolutions a minute. Either unit is sufficient for the present needs of the mill, one being held in reserve.

Hydraulic power is furnished by two Worthington duplex pumps with water cylinders 7¾ in. diameter, steam cylinders 14 in. and 26 in. × 15-in. stroke, and one duplex pump built by the Wilson Snyder Manufacturing Co., of Pittsburgh, with 7¾-in. hydraulic cylinders, steam cylinders 14 in. and 26 in., stroke 24 in. Hydraulic pressure of 500 lbs. per square inch is obtained.

The boiler plant consists of four batteries of two 250 H. P. Geary water-tube boilers and one battery of two 250 Aultman & Taylor water-tube boilers, making a total of 2,500 H. P.

The Shiffler Bridge Co., of Pittsburgh, was contractor for the buildings. Alex. Laughlin & Co., of Pittsburgh, furnished the open-hearth furnaces, soaking pits and producers. The blooming mill was built by Mackintosh, Hemphill & Co.; the other mills and tables by The Lloyd-Booth Co., of Youngstown, O. The Corliss engines were made by The Allis Engine Co., of Milwaukee.





Power-House Accident in Chicago.

An accident occurred at the Throop street power-house of the Metropolitan West Side Elevated Railroad, Chicago, early Sunday morning, Dec. 26, which on account of peculiar circumstances caused much inconvenience, and badly disarranged the train service of that road although the actual damage done to the machinery was trifling. The facts as here given were obtained direct from an official source.

At the Throop street power-house are four compound condensing direct-connected Allis engines, which furnish current for the Metropolitan trains. Since the opening of the Union Loop, whereby about two miles of track was added and additional trains put on, this power plant has been taxed to its full capacity during the busy hours, although before the loop was used there was sufficient reserve power. This condition will exist until the Union Loop power station is completed, which will furnish the current for the Loop tracks.

About a week before the accident above mentioned, a wedge under a main bearing of one of the engines had to be replaced. To do this it was necessary to take down the connecting rods and raise the engine shaft which carries the armature of the generator, thus making necessary the removal of many heavy parts. While the actual repairs made were small yet the engine, for the reasons named, was out of service about a week, during which time only three engines were available to furnish current, and these were often overloaded. It was while this engine was being repaired that the accident occurred.

Early Sunday morning there were two short circuits somewhere on the road which rendered the circuit-breaker at the power-house inoperative, and before it was discovered that the circuit-breaker was out of order a third short circuit occurred. The failure of the circuit-breaker to act promptly overloaded the engines so that the jet condenser used could not properly condense the exhaust steam. On top of the condenser is a small engine with a throttling ball-governor which drives a shaft to which the vacuum pump of the condenser is connected. The increase of pressure in the condenser caused a relief valve to open, which allowed a portion of the steam and water to escape, and some of this water, by wetting the governor belt of the small engine referred to, caused the belt to slip off its pulley. This allowed the small engine to attain such a speed as to burst a heavy cast-iron fly-wheel about 4 ft. in diameter, which was fixed to its shaft.

On account of the breaking of his flywheel the condenser pump cannot be used, and likewise the condenser, until repairs are made. No damage of any consequence was done to the building or other machinery by the bursting of the fly-wheel.

Until the repairs to the small condenser engine are made, which will require about three days, the three available engines will be worked as high-pressure engines without the condenser, but not being designed for such use only about one-half the power can be obtained, as when used in the usual manner. Because of this lack of power only a small number of trains can be run, and the metropolitan train service, as stated before, is badly disarranged at the present writing. It is stated that such an accident could hardly have occurred under the usual working conditions, and was entirely due to the peculiar circumstances mentioned.

Statistics of the Railroads of the United States to June 30, 1896.

The Statistician of the Interstate Commerce Commission has issued advance copies of his ninth annual report, for the year ending June 30, 1896. This issue, in pamphlet form, contains all of the body of the report (120 pages), but not the bulky tables, showing statistics of individual roads, which make up the principal part of the bound volume. The principal totals and averages of this report, with the same items for the two preceding years are as below:

	1896.	1895.	1894.
Miles of railroad completed	182,777	180,657	178,708
Increase in 12 months	2,120	1,949	2,247
Miles of track	240,129	236,894	233,534
Number of corporations	1,985	1,965	1,924
" in hands of receivers	151	169	192
Mileage " " " "	30,475	37,865	40,818
Corporations operating over 1,000 miles	44	42	44
Locomotives	35,950	35,699	35,492
Cars, passenger	33,003	33,112	33,018
" freight	1,221,887	1,196,119	1,205,169
" total	1,297,649	1,270,561	1,278,078
Cars and engines with power brakes	448,854	362,498	330,992
Cars and engines with automatic couplers	545,583	408,856	357,621
Employees	826,620	785,431	779,608
Employees per 100 miles of line	454	441	444
Employees in M. W. department	134	128	1:3
Employees maint. equipment	92	88	86
Capital stock, common, millions	$4,256.6	$4,201.7	$4,103.6
" " preferred, "	970.0	759.6	730.5
" " total, "	5,226.5	4,961 3	4,834.1
Funded debt, millions	5,340.3	5,385.5	5,356.6
Current liabilities, millions	.....	616.8	605.8
Total stock and fund'd debt, millions	10,566.9	10,346.8	10,190.7
Total stock and funded debt, per mile of road	59,610.0	59,650 0	.....
Dividends paid, millions	87.6	85.3	95.5
Percentage of stock receiving no dividends	70.0	70.0	63.4
Percentage of bonds receiving no interest	16.3	13.4	14.2
Average dividend on dividend-paying stock	5.6	5.7	5.4
Gross earnings, year, passenger, millions	$266.6	$252.2	$283.3
Gross earnings, year, freight, millions	786 6	730.0	699.5
Gross earn.. year, total, millions	1,150.2	1,075.4	1,073,4
Operating expenses, millions	773.0	725.7	731.4
Per cent. of expen. to earnings	67.20	67.48	68.14
Net earnings, millions	$377.2	$349.7	$342.0
Other income, "	129.0	132.4	142.8
Fixed charges, etc. "	416.6	426.0	429.0
Net, available for divid., millions	89.6	56.1	55.8
Gross earnings per mile of road	$5,320	$6,050	$6,109
Passengers carried, millions	511.8	507.4	540.7
" " one mile, millions	13,049.0	12,188.4	14,289.4
Freight carried, million tons	765.9	696.8	638.2
" " one mile, million tons	95,328.4	85,227.5	80,335.1
Average passengers in train	39	38	34
" " journey, miles	25.5	24.0	26.4
" " freight train load, tons	198.8	189.7	179.8
Passenger train mileage, millions	332.9	317.6	326.5
Freight " " "	479.5	449.3	446.8
Revenue per passenger per mile, cents	2.02	2.04	1.99
Revenue per ton per mile, mills	8.06	8.39	8.60
" " pass'ger train mile	$0.99	$0.98	$1.05
" " freight " "	1.63	1.61	1.56
Employees killed	1,861	1,811	1,823
" injured	29,969	25,696	23,422
Passengers killed	181	170	324
" injured	2,873	2,375	3,034

It will be observed that the operated mileage of railroads differs from the total length of railroads. This is due to the use of sections of road by the trains of two or more companies and, apparently, to the failure of some roads to report. The operated mileage for 1896 is 181,983; the number of miles operated under trackage rights is 4,718, which, deducted from the total, leaves the net mileage operated 177,265, which is 5,512 miles less than the total length of road reported (182,777).

The summaries in the report are given in great detail nearly all of them for each of the well-known 10 geographical groups. The statement showing the number of cars equipped with automatic couplers gives the

names of all such couplers in use, and these statistics are given for each make of coupler for eight years, enabling the reader to note the progress of each kind.

The number of employees shown in this report, 826,020, is more than in 1892, though the number per 100 miles of line (454) is 52 less than in that year.

It will be observed that the statement of capital in this report does not include current liabilities. This item is omitted at the request of the Executive Committee of the Association of American Railway Accounting Officers.

It will be noted that while capital stock has increased during the year by over 265 millions, funded debt has decreased about 45 millions. A part of the decrease in debt is due to the fact that the Long Island Railroad is not included in the report this year; but, aside from this, the change in the ratio of stock to debt is marked, and Mr. Adams calls attention to the fact, which, he says, is explained by the financial difficulties which certain large roads have suffered. During the year there has been a decrease in mortgage bonds of $123,883,485, while during the same period there has been an increase in income bonds of $71,822,751. In this connection a table is given showing the stock and the debt per mile of line in the different groups for the two years 1895 and 1896.

A table showing the amount of stocks and bonds owned by railroad corporations (and the amounts not thus owned) is given for eight years; this, with a table of expenditures, separating those of operating companies from those of companies operated by other companies, throws some light on the extent to which the financial statistics in the report are duplicated.

It will be seen that the net income, $89,631,926, is about two millions greater than the total amount of dividends declared, whereas in the preceding year there was a deficit of nearly 30 millions.

The revenue per ton mile has steadily increased since 1890, the figures for the successive years being, in mills, 9.41, 8.95, 8.98, 8.78, 8.69, 8.39, 8.06, while the average freight-train load has increased from 175 tons in 1890 to 199 tons in 1896. The revenue per train mile during these seven years has remained substantially stationary. Omitting 1894, when it was $1.56, the average is $1.64, and none of the years varies from this more than about one or two cents.

The number of passengers killed during the year as compared with the total number carried was 1 in 2,827,474, and as compared with the number carried one mile, 1 in 72,093,963. In Group I (the New England states) this ratio is only about one-half as large, or 1 to 139,050,858.

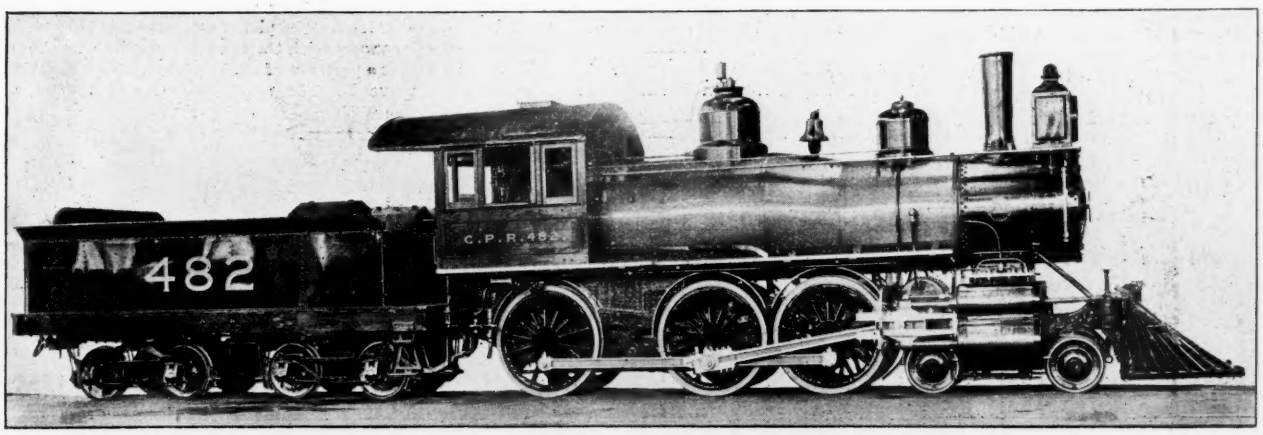
The number of employees killed in coupling accidents in the year now reported was 229 and of injured 8,457; for 1895 the figures were 291 and 8,137; for 1894 they were 251 and 7,240.

Among the statistics not shown in the foregoing three-year table, but which are summarized at length in the report, are: the average number of engines and cars per 100 miles of road, per million passengers and per million tons of freight carried: the passenger miles per locomotive, ton miles per locomotive, etc.; the number of employees per 100 miles of line, for each of 18 classes, according to occupation; average daily compensation of employees, classified as before, and for five years; the total amounts paid to these various classes, for two years; classification of stocks by rate of dividends and of bonds by rate of interest. Of the income bonds reported (over 300 millions) 88 per cent. received no interest.

Statistician Adams says that the statistical work of the Commission has been rendered unusually difficult by the imperfect reports of roads in the hands of receivers; so much so, indeed, that the propriety of special receivership reports has been considered. The difficulty arises from the fact that auditors in the employ of receivers are not officially in possession of the information needed for a complete report. In the adjustment of the capital accounts of roads under the custodianship of the courts the purpose has been to continue the stock and bond statements as they appeared before the date of receivership until the date of reorganization, in order that a comparison of the balance sheets might indicate the result of reorganization in case a reorganization was effected. This, however, it has not always been possible to accomplish.

Two Recent Baldwin Locomotives.

The engravings which appear herewith are from Photographs of two locomotives recently built by the Baldwin Locomotive Works. One of them is one of thirteen Vauclain compounds lately delivered to the Canadian Pacific. The other is a 12-wheel freight locomotive, simple, for Millars', Karri & Jarrah Forests, Limited, of Western Australia. The principal dimensions and other particulars of these locomotives appear in the tables below.

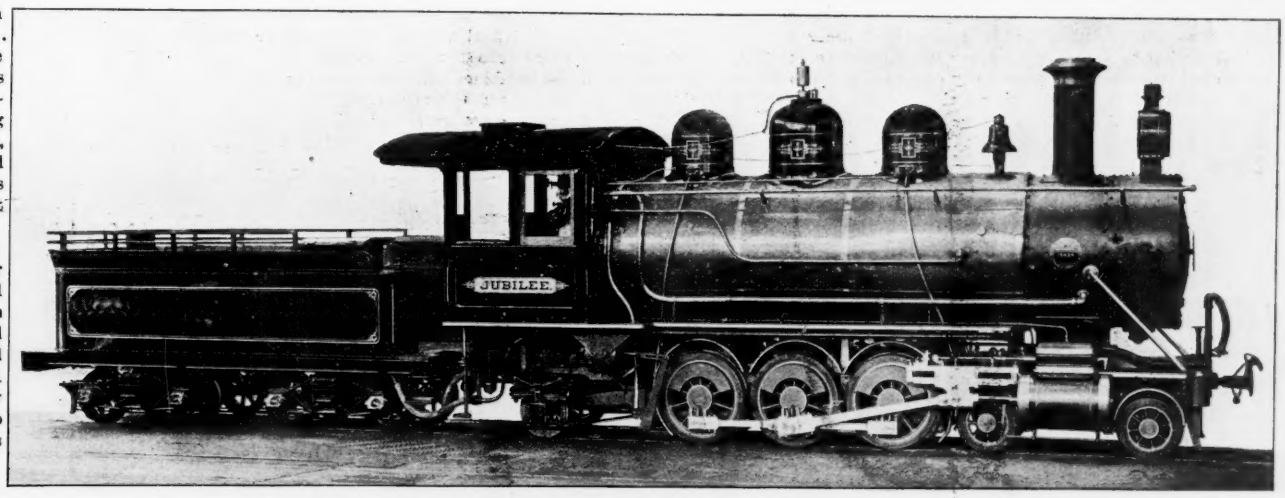


Vauclain Compound Locomotive for the Canadian Pacific.

VAUCLAIN COMPOUND LOCOMOTIVES—CANADIAN PACIFIC.

Gage	4 ft. 8½ in.
Cylinders, high pressure	13½ in. × 24 in.
" low pressure	23 in. × 24 in.
Drivers	62 in.
Total wheel base	23 ft. 11¼ in.
Driving wheel base	13 ft. 5 in.
Weight, total	127,140 lbs.
" on drivers	95,490 lbs.
Boiler, diameter	56 in.
No. of tubes	223
Diameter of tubes	2 in.
Length of tubes	12 ft. 7⅝ in.
Firebox, length	96½ in.
" width	42½ in.
Truck wheels, diameter	28 in.
" journals	5 in. × 8 in.
Driving axle journals	8 in. × 8½ ins
Firebox, length	72 in.
Firebox, width	39 in.
Heating surface, F. B.	92 sq. ft.
Heating surface, tubes	1,018 sq. ft.
Heating surface, total	1,110 sq. ft.
Truck wheels, diameter	24 in.
Truck journals	4 in. × 6 in.
Driving axle journals	6½ in. × 8 in.
Tender capacity	2,000 U. S. galls.
Tender wheels, diameter	28½ in.
Tender journals	3½ in × 7 in

Boiler material, steel, 11/16 in. thick. All longitudinal seams butt jointed, with double covering strips. Fuel, chiefly wood. Working pressure, 160 lbs. Firebox of copper, with copper staybolts. Automatic vacuum brake on driving and tender wheels, also hand screw brake. Le Chatelier brake valve on line of lower gage cock. Magnesia sectional lagging. Nathan sight feed lubricators. United States metallic packing on piston rods and valve stems. Two Sellers injectors.



Baldwin 12-Wheeler for Western Australia.

Tender capacity	3,200 Imperial galls.
" wheels, diameter	33 in.
" journals	4¼ in. × 8 in.

Westinghouse American Outside Equalized Air Brake on all driving and tender wheels, with 9½ in. air pump. Boiler material, steel, 11/16 and ¾ in. thick. All longitudinal seams butt jointed with double covering strips. Working pressure, 200 lbs. per square inch. Magnesia sectional boiler lagging. Nathan sight feed lubricators. United States Metallic packing on piston rods and valve stems. Two Gresham automatic restarting injectors.

BALDWIN 12-WHEELER FOR WESTERN AUSTRALIA.

Gage	3 ft. 6 in.
Cylinders	16 in. × 20 in.
Drivers	39 in.
Total wheel base	20 ft. 8 in.
Driving wheel base	7 ft.
Weight, total	90,530 lbs.
Weight on drivers	70,230 lbs.
Boiler, diameter	60 in.
No. of tubes	194
Diameter of tubes	2 in.
Length of tubes	10 ft. 3 in.

Suspended or Supported Joints.

What follows is a part of a letter from Mr. C. P. Sandberg, published in *Engineering* (London) of Dec. 3:

It is now about 30 years ago since the suspended rail-joint was introduced. During these 30 years I have done my share to improve the suspended rail-joint by adopting angular and deep fishplates, so as to give the rail-joint the same stiffness as the solid rail. Since then it has been found that the supports were to be more relied upon to keep the joints up than any design of fishplates, so the joint sleepers have been brought together more and more, now only leaving the space absolutely necessary for packing. Thus I have arrived at the so-called Goliath joint. This was applied to my 100-lb. rail, which has now been seven years in service in St. Clair's tunnel, Canada, with good results. It has also been down on the Furness Railway for seven years, near Barrow, for trial in comparison with the English type of road, where it may now be seen giving satisfactory results. Last year this rail-joint was adopted on the Swedish state line for my 90 lb. rail. It gives the best line for the least money compared with the main lines in Europe, and it may thus be taken for the best type of the suspended joint. The larger bearing surfaces which my new rail sections offer have been of material advantage in supporting the joint, but although it carries the same load in testing as the solid rail, good ballasting is required to give good results. The use of coarse stone ballast has proved to be the best means of keeping the joint up, but it is very expensive, and in some localities it is almost impossible to obtain.

It is therefore important to find a design of joint, whether supported or suspended, that will give the best road with ordinary ballast and maintenance. I have designed a three-sleeper supported rail-joint, with angular fishplates for the same rail as the Goliath suspended joint. The weight of the fishplates for both joints is about the same, but the fishplates for the Goliath joint have spike holes and direct bearing on the sleeper, while for the supported joint they have slots to prevent creeping of the rails.

To prevent the flattening of the rail ends, the steel has been lately increased in hardness by chemical composition, particularly by carbon; but the International Railway Congress, held in London, 1895, refused to confirm a former resolution to the effect that a harder steel would be recommended. On the contrary, the majority stated that the question is not sufficiently matured, and the English engineers particularly were in favor of a rail steel of medium hardness.

Bearing in mind that the harder the rail the more it is apt to break in many pieces when weakened by long service, it would be a dangerous practice to resort to excessive hardness, particularly in countries with cold climates. The slight gain in hardness between .45 and .55 per cent. carbon is more than balanced by the greater risk of fracture, and such means should only be resorted to with great caution, and after all has been done in the direction of improved joints, best ballast obtainable, and the most careful maintenance.

The supported rail-joint has now a greater chance in competition with the suspended one than 30 years ago, for not only is it supported by three sleepers instead of one, but both fishplates and rails can be rolled with flatter and sharper bearing surfaces than formerly, which is of great service in holding up the joint, if the designer of the rail sections has taken advantage of this progress in rolling steel.

Even in England the supported joint is gaining ground, and several railways are trying it: for instance, the London & North Western are trying Webb's patent chair. The London, Chatham & Dover Railway adopted joint chairs some time ago, and they are now generally used on their system and give satisfactory results.

Regarding the increased weight of rails, it is no doubt very good also for the joint, but it is not sufficient to increase the weight alone; the material must also be distributed in a good rail section for fishing. This is often overlooked, and the expected advantages of a heavier rail are not then realized.

At the last International Congress it was decided that where express trains were run with a speed of 50 miles or more per hour, the weight of the rails should be 80 lbs. or more per yard. When I, in 1886, suggested my 100 lbs. per yard section to the Belgian State Railways, I was considered extravagant. The three largest railways in England have now increased the weight of their rails to 100 lbs., or to 103 lbs., besides having a chair weighing about 50 lbs., which should improve the joint in proportion.

The Hoadley-Knight Compressed Air Motors.

The development of compressed air motors in this country has not been at a standstill during the past few months, although the subject has not attracted the general interest or been as freely discussed as it was about a year ago. The satisfactory results of efficiency and economy compared with European air motors which have been obtained the past year in New York have caused on the one hand an over-estimation of the possibilities of

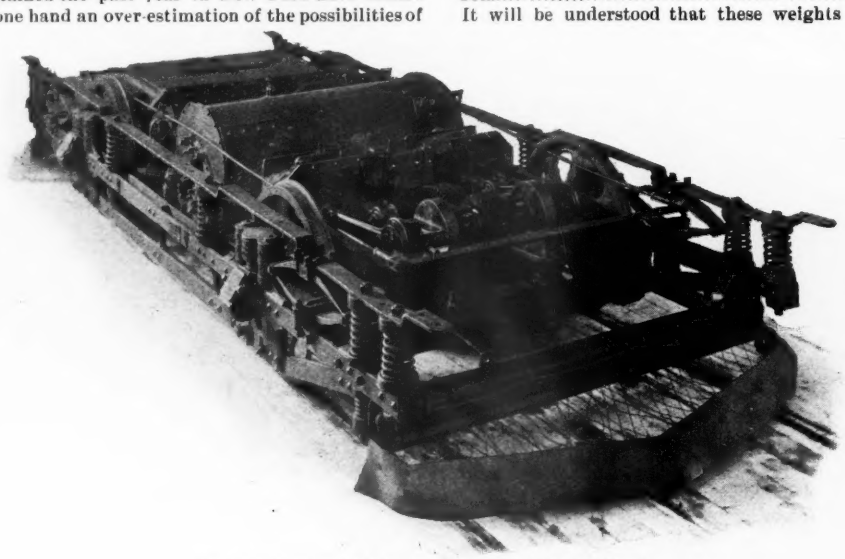


Fig. 1.—Hoadley-Knight Compressed Air Motor Truck.

compressed air for this service and on the other many unjust criticisms by advocates of other motive powers. While it is not held that compressed air is a competitor of the overhead trolley, yet it is safe to assume, from what has been learned from actual operation, compressed air should find a field of its own, and be as economical, all things considered, as electricity. The large amount of money already expended is a proof that capitalists have considered the question seriously, and the importance would be immediately understood if such cities as Philadelphia or Boston should order the trolley wires to be removed. Were it not for the cost of the conduit, experiments with any other form of power than electricity would be worse than useless from an economical point of view.

From the foregoing statements it must not be assumed that the compressed air car is perfected and that no difficulties will be encountered in its operation. On the contrary, the results already obtained, although speaking well for the advance in the field of traction, only show what the motor must overcome in order to be a worthy competitor from an operating point of view with electricity. Within three years two men, Messrs. Joseph Hoadley and Walter H. Knight, both experienced in the problems of traction, have attacked the question of the most advantageous manner of applying the power, with the result that for a year and three months cars of the type here described have been in successful operation.

The weight of the cars does not vary widely from the weight of electric cars, as may be seen from the following figures which give the approximate weights of the different parts:

Car body	6,500 lbs.
Truck	4,500 "
Air reservoirs (12)	3,600 "
Motors (two)	3,000 "
Heater (empty)	500 "
Controlling apparatus and appurtenances	400 "
Piping	150 "
Total	18,650 "

It will be understood that these weights may vary somewhat according to the service required. The details of the construction may be followed from the following description:

Fig. 1 shows an engraving of a truck of one of the cars which has been in actual operation. The parts have been so far removed as to show the general plan of the compact arrangement of the cylinders, the moving parts and the re-heater. The flow of the air from the time it leaves the storage reservoir until it is exhausted from the low-pressure cylinder can be easily followed by aid of the accompanying sectional views. In Fig. 2 the valve *V* admits the air to the storage reservoirs, which communicate with the combined throttle and reducing valve *R* after passing around the heater, *E*, for a few times. This heater contains hot water under a pressure of from 225 to 300 lbs. per square inch, which is heated by steam at the same time that the reservoirs are being filled at the charging station. The pressure being reduced to, say, about 320 lbs. per square inch, the air passes through a coiled pipe placed in the re-heater, which raises the temperature of the air, and thus increases greatly its capacity to do work. Before the air passes into the high-pressure cylinder hot water is injected into the heated air, the effect of which will be considered later in connection with an explanation of the diagram Fig. 9. After leaving the high-pressure cylinder, the air is again warmed by causing it to flow through pipes in the hot water heater, and again hot water is sprayed into the pipe containing the air before passing to the low-pressure cylinder. This process may be followed more closely from Fig. 3. Here it will be seen from the plan view that the pipes *A* and *B* which connect with the reservoir meet at *C*. These are stored at a pressure of from 2,000 to 2,400 lbs. through the valve *D*. The air passes around the hot water

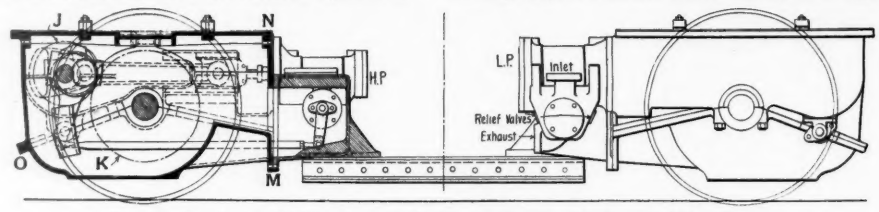


Fig. 5.—Section and Elevation of Oil Chest, Showing Hackworth Valve Gear.

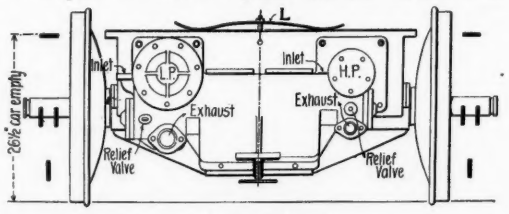


Fig. 6.—End Elevation.

heater *E*, after which it passes to the reducing valve *F*, through the reheater *E* and to the working cylinder as previously described. The four storage reservoirs, which are placed under the body of the car, as seen in this figure, have been dispensed with in the cars now in operation, it having been found unnecessary to store more air than could be placed in the receivers under the car seats. The two cars now in service on the Metropolitan line in New York have a storage capacity of 45 cu. ft.

Fig. 4 shows the arrangement of the two high and the two low-pressure cylinders, the ironclad motor and the gearing used in changing the reciprocal into rotary motion. The crank shaft from *H* to *H* is cast in one piece. From Figs. 4 and 5 it will be observed that all the moving parts of the motors proper run in a cast-iron box or casing, which is partially filled with oil, making it unnecessary to use any oil cups on any part of the machine. The machinery at the low-pressure end also runs in a bath of oil, similar to that shown at the high-pressure end as *O. N. P.* The high-pressure cylinders are 4 in. in diameter and 6-in. stroke, and the low-pressure cylinders are 8 in. in diameter with the same stroke as the high-pressure cylinder. The pinion on the crank shaft is 9 in. in diameter and meshes into a 23-in. gear wheel. In order to examine any of the machinery in this chest, it is necessary to simply remove the large cover, which is held in position by a spring *L*. The Hackworth valve gear, shown somewhat in detail, has given very satisfactory results, it being particularly adapted to this class of work.

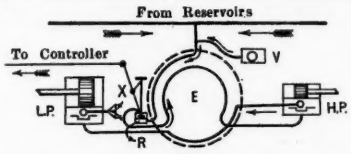


Fig. 2.—Diagram Showing Flow of Air.

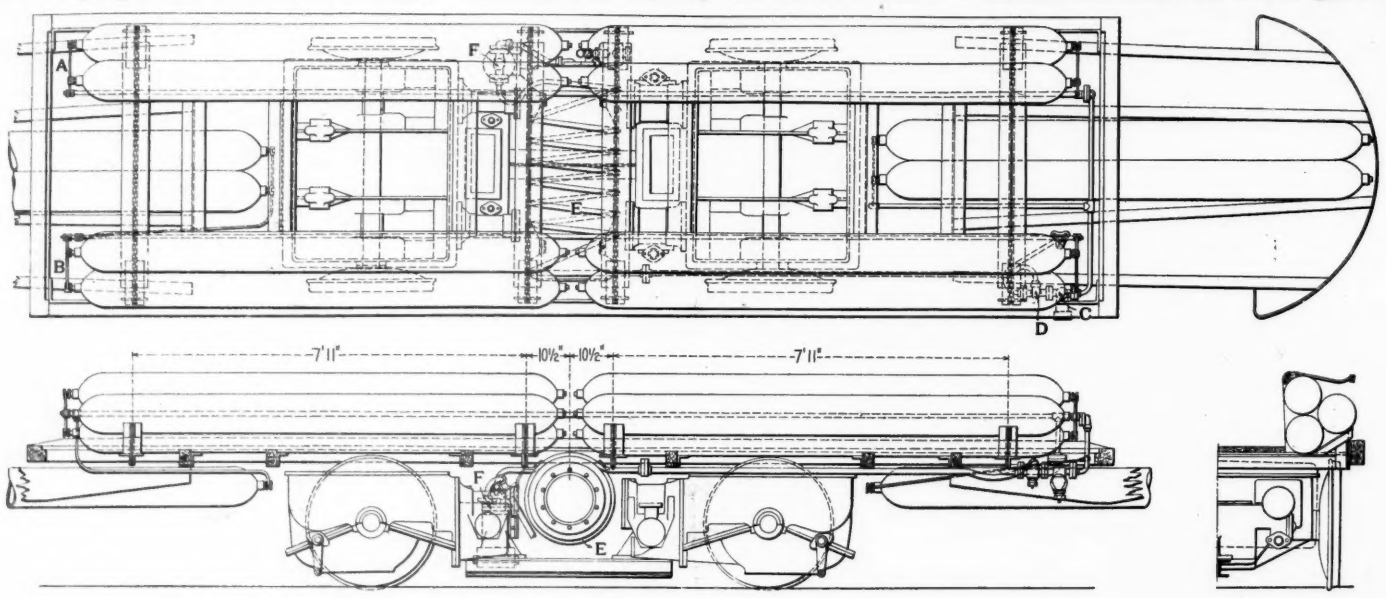


Fig. 3.—Plan and Side Elevation Showing Location of Reheater and Air Reservoirs

Probably the most ingenious device in the motor is the combined throttle and reducing valve (*R*, Fig. 2), the details of which are given in Fig. 8. By means of these figures, together with the following explanation, the method of its operating may be understood:

The power is controlled by a single handle from either end of the car. A movement of the handle in one direction starts the car forward with a force proportional to the distance the handle is moved. A reversing movement of the handle stops the car, and a still further reversing movement reverses the motors.

The controlling lever operates to open and close the throttle, and also to simultaneously vary the reversing and cutoff mechanism. A toggle lever arrangement connected with the controller mechanism operates on the reducing valve to force it to its seat at the same time as the distributing valves of the motors are placed in their mid-link position. A movement in either direction of the controller throws the toggle off center, and release the valve, so that it can be left to the control of the diaphram to which it is attached, and which, responding to the pressure in the receiver beyond the valve, serves to hold the receiver pressure at a fixed amount, an adjustable spring tending always to force the valve open against the tendency of the diaphram to force the valve closed, as is customary in reducing valves. When the throttle valve opens and the receiver pressure attains a sufficient degree, an automatic valve influenced by this pressure opens a small aperture admitting the highly heated water from the heater to the pipe, immediately preceding the high-pressure motor, the valve being closed again automatically by a spring when the receiver pressure falls, due to the closing of the throttle valve. A small air pipe from the receiver to the top of the hot water reservoir, provided with a check valve, serves to maintain a pressure over the hot water always equal to the maximum receiver pressure, and sufficiently greater than the average receiver pressure to insure a proper discharge of the water. A hand valve in the same pipe as the automatic valve enables the amount of water used to be adjusted from time to time, or once and for all, as circumstances may direct. The arrangement as shown in Fig. 8 has been somewhat modified, but the principle on which the valve acts is precisely the same. When the toggle lever is forced to one side the diaphram is free to control the pressure independent of the action of the throttle valve. With a little practice the motorman can regulate the amount of air admitted to the cylinders with considerable nicety, and as this is the only regulating valve controlled by the motorman, the car is always under his control.

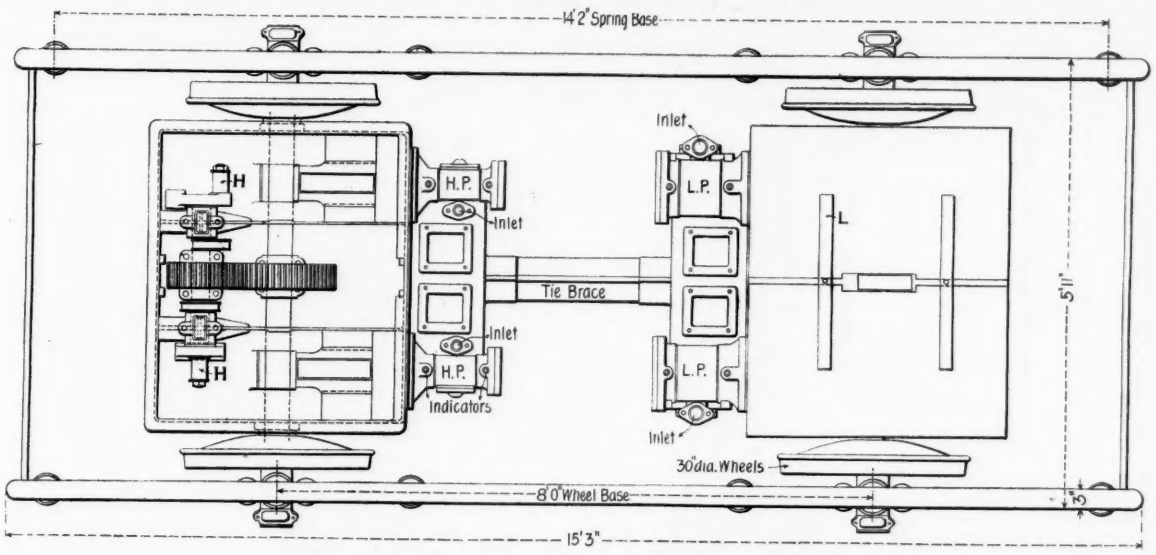


Fig. 4.—Plan Showing Arrangement of Cylinders and Gearing.

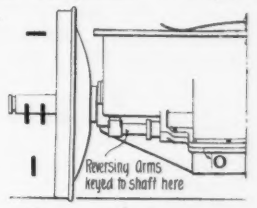


Fig 7.—Rear Elevation

Fig. 8 —Combined Controlling and Reducing Valve.

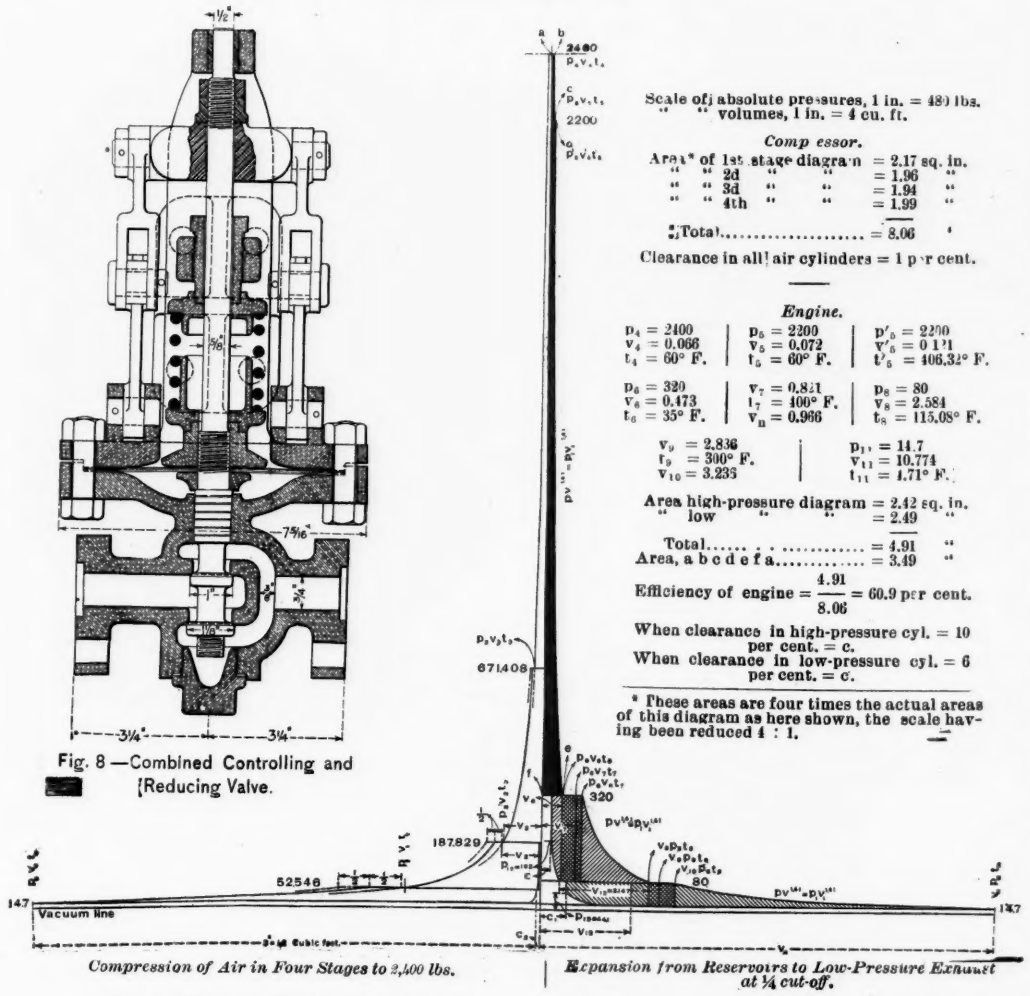

Scale of absolute pressures, 1 in. = 480 lbs.
" " volumes, 1 in. = 4 cu. ft.
Compressor.
Area of 1st stage diagram = 2.17 sq. in.
" " 2d " " = 1.96 "
" " 3d " " = 1.94 "
" " 4th " " = 1.99 "
Total..... = 8.06 "
Clearance in all air cylinders = 1 per cent.
Engine.
p4 = 2400 v4 = 0.066 t4 = 60° F.
p5 = 2200 v5 = 0.072 t5 = 60° F.
p'5 = 2200 v'5 = 0.171 t'5 = 406.32° F.
p6 = 320 v6 = 0.473 t6 = 35° F.
v7 = 0.821 t7 = 400° F. vn = 0.966
p8 = 80 v8 = 2.584 t8 = 115.08° F.
v9 = 2.836 t9 = 300° F. v10 = 3.235
p11 = 14.7 v11 = 10.774 t11 = 1.71° F.
Area high-pressure diagram = 2.42 sq. in.
" low " " = 2.49 "
Total..... = 4.91 "
Area, a b c d e f a..... = 3.49 "
Efficiency of engine = 4.91 / 8.06 = 60.9 per cent.
When clearance in high-pressure cyl. = 10 per cent. = c.
When clearance in low-pressure cyl. = 6 per cent. = c.
* These areas are four times the actual areas of this diagram as here shown, the scale having been reduced 4 : 1.
671408
187829
52546
320
80
147
Vacuum line
147
Compression of Air in Four Stages to 2,400 lbs.
Expansion from Reservoirs to Low-Pressure Exhaust at 1/4 cut-off.

Fig. 9.—Diagrams Showing the Work of Compression and Expansion—Hoadley-Knight Compressed Air Motor.

The question has been repeatedly raised as to the efficiency of the motor when the air is used in two cylinders, as in the Hoadley-Knight cars. The theoretical cards when the air is compressed in four stages to 2,400 lbs. are given in Fig. 9. The pressure at each stage is shown on the left-hand diagram. It will be noted that the compression takes place midway between the isothermal and adiabatic. The area of these cards on the scale shown in the figure is 2.015 sq. in., while the area of the cards of both high and low-pressure cylinders is 1.227, making the efficiency of the motor 60.9. It should be observed, however, that this is not the actual efficiency of the motor as a whole, there being certain losses not shown in this diagram, but which are known to exist, and as far as possible these are reduced to a minimum and the efficiency of the air from the time it leaves the reservoir at the higher pressure to the time it is exhausted at the lower pressure cylinder is very accurately known.

It has been found in actual service that about 35 per cent. of the indicated power of the compressor is delivered at the axle in driving the motor, and of the total amount stored, about one-half is actually available in the motors. Were it not for the reheater, this figure would be reduced by at least 50 per cent., and the cost of reheating, from tests made on the Hardie motor, prove that it amounts to but about one-fifth of the cost of compressing the air.

The high-pressure engine diagram in Fig. 9 shows very clearly the amount of energy lost due to the reduction of pressure. The air being stored at 2,400 lbs., it is reduced to about 320 lbs., and the area shown in heavy black (8725 sq. in) represents the amount of work lost by wire drawing and to other causes during the reduction in pressure, and it is about 43 per cent. of the total area of the compressor cards. At point *e*, the air pressure is 320 lbs., the volume .473 cu. ft., and the temperature 350 deg. F. Here the air expands and is heated and hot water is also added, making the volume V_6 increase to V_n, and the increase to V_7 represents the increase of work due to the reheating. Here it amounts to 71.5 per cent. The volume represented by the shaded area between V_7 and V_n represents the increased work due to the vapor which has been forced into the air, and which, it is believed, acts precisely the same as the steam in the cylinder, inasmuch as the pressure being reduced in the working cylinders, a part of the water is vaporized. This increase in the case before us is 22.6 per cent., making the total increase in volume 104.1 per cent. in the high pressure diagram. But from each of these figures should be deducted the clearance volume of 10 per cent.

In the low-pressure cylinder quite different conditions are found to exist, and the results show that the reheating in this cylinder is very small compared to the gain due to reheating in the high-pressure cylinder. In this latter case the total increase in volume is 25.4 per cent.; the increase due to the reheating alone is but 9.8, while the increase due to the addition of the water is 16.2 per cent. Here again we have included the clearance volume, which in the low-pressure cylinder is 6 per cent.

Fig. 10 shows two indicator cards plotted from dia-

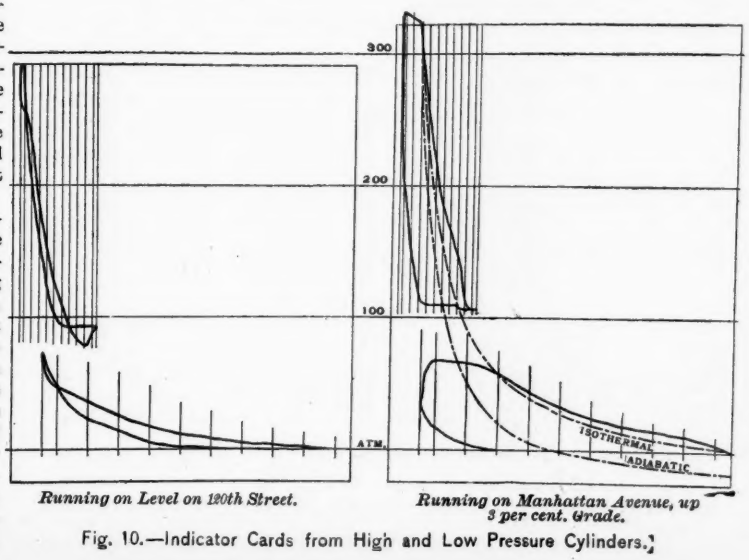


Fig. 10.—Indicator Cards from High and Low Pressure Cylinders.

grams taken while the car was in service. The one on the left, which was taken when the car was running on a level track, shows almost no work done by the air; while the one on the right, showing cards taken while the car was running on a three per cent. grade, better illustrate the conditions usually met with. Were the expansion nearly adiabatic, the work done by the low-pressure cylinder in this latter case would be almost nothing, and here it may be plainly seen that the reheating relatively increases the work in the lower pressure cylinder more than in the high, although the figures referred to in connection with the diagram in Fig. 9 seem to indicate otherwise, the variation being due apparently to different ratios of expansion in the two cases. The work in the low-pressure cylinder would amount to very little were it not for the second reheating. The lost area between the cards has been reduced since those cards were taken by an enlargement of the pipe which leads the air from the high to the low-pressure cylinder.

The amount of free air required to propel a 34-ft. car weighing 18,000 lbs. has been determined with considerable accuracy and is found to be from 30 to 40 lbs.

The cost of compressing is also accurately known, which, with the reheating and maintenance of the motor, amounts to 2.9 cents per car-mile when used in the manner indicated in this description. The cost is divided as follows: About 11 lbs. of air can be compressed to 2,000 lbs. to a square inch per horse-power hour, and the cars require therefore an average of about 3½ horse-power hours per car mile. It costs about ¼ cent for each horse-power hour, making this item 1.75 cents. The hot water for reheating is figured at .15 cent and the maintenance of the motor at 1 cent, making the total as previously given 2.9 cents. This compares favorably with the average cost of motor power on 19 electric roads in Connecticut in 1896, each of which carried over 1,000,000 passengers during that year. This amounted to 2.56 cents per car mile (exclusive of maintenance) and the per cent. of operating expenses to gross receipts was 69.6 per cent. The cost of motive power by the electric conduit roads in New York City is considerably lower than this amount, and the same may be said of the motive power item of operating expenses in Brooklyn.

The company has made considerable progress in the development of strong, light and safe steel flasks for the air reservoirs. After trying all the different makes of air flasks, both from this country and abroad, it instituted a series of very elaborate and expensive experiments, with a view of increasing both the ultimate strength and the elongation of the metal. Other experiments with nickel steel have shown that flasks can be made with 120,000 lbs. tensile strength and 30 to 40 per cent. elongation; such flasks require 13,000 lbs. per square inch to rupture them, but when ruptured with air at this pressure they remain in one piece. They hope to be able to reduce the weight of the flask to 50 lbs. per cubic foot, while maintaining a factor of safety of three, and it is claimed that the experiments already made show that such a result can be easily obtained.

80,000 Lbs. Capacity Coal Cars—Chicago & Eastern Illinois Railroad.

As noted in our issue of Dec. 17, the Chicago & Eastern Illinois has ordered coal cars of 80,000 lbs. capacity from the Haskell & Barker Car Co., to be built according to specifications and drawings prepared by Mr. T. A. Lawes, Superintendent of Motive Power and Equipment.

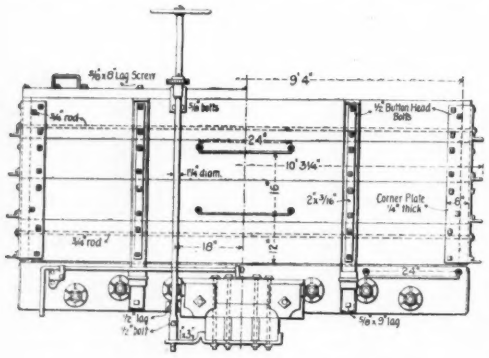


Fig. 1.—Half End Views—80,000 Lbs. Coal Car.

These cars have a capacity of 1,176 cu. ft. when loaded level with top of the sides. They are 36 ft. over end sills and 35 ft. 7⅛ in. long inside measurement; the inside width is 9 ft. 4 in., and the sides are 3 ft. 6⅛ in. high, measured from the floor line. The comparatively low sides are obtained by placing the stakes inside the sideboards, thus increasing the width of the coal space; at the ends of the cars the stakes are on the outside The lower ends of the stakes are secured to the side and end sills by means of ¾ in. U-bolts and ⅝-in. carriage bolts.

Fig. 1 shows half views of either end of one of the cars, Fig. 2 a plan of the underframe and floor and Fig. 3 shows sections at the body bolsters and needle beams. From these illustrations it will be seen that the longitudinal sills, namely, the side, center and two intermediate sills, on either side of the center, are all of Southern pine 5 in. wide × 10 in. deep, the end sills 9 in. × 11¾ in., the draft timbers 5 in. × 6 in., and the needle beams 4 in. × 10 in. are of oak. The flooring, 1¾ in. × 6 in., and the sideboards, 2 in. × 10½ in., are Southern yellow pine. Tower couplers are used.

The body bolster, shown in Fig. 3, is built up of a straight steel top plate ¾ in. × 10 in. and a lower plate

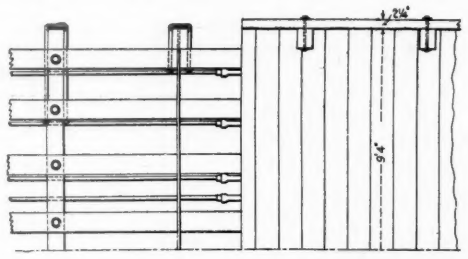
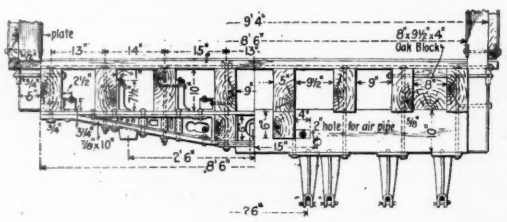


Fig. 2.—Plan Showing Underframe and Floor—80,000 Lbs Coal Car

⅛ in. × 10 in., so as to form a truss 6 in. deep at the center; the truss is strengthened by malleable iron castings placed between and riveted to the top and bottom members.

Fig. 4 shows the style of truck used, which is now being introduced by the Haskell & Barker Car Co. The



Half Section at Body Bolster. Half Section at Needle Beam.

Fig. 3.—80,000 Lbs. Coal Car—C & E. I. R. R.

usual arch bar diamond frame is used in connection with a bolster built up of top and bottom steel plates, between which are malleable iron filling pieces; the upper plate is ⅞ in. × 11 in. and the lower plate ⅝ in × 11 in. A steel channel is used in place of the usual spring plank and the springs support the ends of the truck

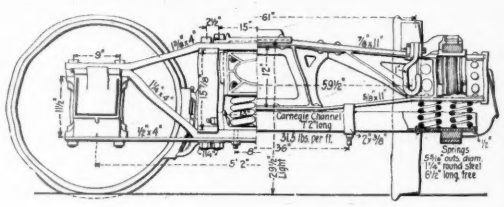


Fig. 4.—Metal Truck—80,000 Lbs Coal Car.

bolster. Steel axles are used and the cars are equipped with Westinghouse air-brakes.

We are indebted to Mr. Lawes for the drawings and specifications of these cars.

An English Observer on American Fast Trains.

What follows is the principal part of a letter from Mr. Acworth to the editor of *The Engineer*, London:

"Having lately returned from a visit to the United States, during which I traveled upward of 1,000 miles on the engines of their crack expresses, I should like to say a few words on the question of American railway speeds. . . . First, as to the 'Atlantic City Flyer.' You state categorically that you believe the record you have published to be fallacious. Now I am quite aware that American railway men have, in some instances, allowed records to go out, apparently with their endorsement, which yet could not stand investigation; but I have no doubt whatever that the Atlantic City performances have, as a whole, been accurately reported, though doubtless the accuracy of the intermediate times is not exactly what we might have looked for. For not only have the Philadelphia & Reading officials and the Baldwin Locomotive Company made themselves responsible for them, and this, not for one month's running only, but for two months; but further, Mr. Voorhees, First Vice-President of the Reading, has publicly complimented the 'engineer' of the train on his record performance. Now, considering that probably at least 10,000 passengers, first and last, traveled by the train, and that its origin was due to a disagreement with the competing Pennsylvania Railroad, is it reasonable to suppose that the record, if inaccurate, would have remained entirely unchallenged, as to the best of my belief it has, in fact, done? Further, the same company has been running for some time past, and is still running, a train booked to cover the 55½ miles in 55 minutes, and this train is not only heavier, but uses ordinary instead of picked coal. And that this train, the 4 p. m., ex Philadelphia, keeps time with consummate ease I can testify from personal experience.

"For, having gone to Philadelphia on Sept. 9, in order to travel on the 'Flyer,' and having found to my disappointment that it had ceased to run two or three days previously, I went down on the date mentioned by the 4 p. m. Here are the times taken by me with a split-seconds stop-watch for every mile from start to stop. I may say that, for convenience of record, I wrote down the nearest whole second, though my watch registered fifths of seconds. But the total time, from the moment the wheels began to turn till they ceased to move, is absolutely exact. Further, in some cases, owing to passing trains or some other accidental causes, I missed a post, and in those cases I have bracketed that mile and the next together:

Miles.	Seconds.	Miles	Seconds.	Miles.	Seconds.
1	175	20	49	39	50
2	92	21	51	40	51
3	71	22	50	41	52
4	64	23	53	42	51
5	65	24	50	43	54
6 }	119	25	53	44 }	105
7 }		26	53	45 }	
8	57	27	53	46	51
9	53	28	51	47	51
10 }	105	29	48	48	52
11 }		30	48	49	52
12	50	31	5	50	53
13	52	32	49	51	57
14	54	33	48	52	48
15	60	34	51	53	50
16	59	35	51	54	53
17 }	115	36	50	55 }	204
18 }		37	50	stop }	
19	52	38	48		

Total time 3,210 seconds = 53½ minutes for 55½ miles.

"It will be seen that from the fifth to the fifty-fourth mileposts the speed only varied between 60 and 75 miles an hour. It will be noted also that the last dozen miles or so, which are slightly down hill, are slower than the middle of the run—proof sufficient surely that the engine was running within herself, at least when coupled with the fact that we were on arrival 2 min. in front of time. . . .

"A week or two later I traveled on the Empire State Express of the New York Central. The load was 178 tons—English—behind the tender. From Syracuse to Rochester, 80½ miles, we ran in 80 minutes; from Rochester to Buffalo, 68 miles, we took 72 minutes, spite of a dead slow over a bridge that was being slewed, and three miles at half-speed through the streets of Buffalo. Here is a record of the seconds taken for 18 consecutive miles with this train—51, 49, 48, 48, 47, 46, 46, 47, 47, 46, 46, 92—two miles—46, 46, 48, 45, 47.

"Here is another record, this time from the 'Black Diamond' Express of the Lehigh Valley Company. Load 165 tons—English—behind the tender; Geneva to Sayre, 73½ miles in 74 minutes; Easton to Jersey City, 76 miles in 79 minutes, with two regular station stops at South Plainfield and Newark, included. And these, be it observed, are not special racing trains, but ordinary every-day expresses which run all the year round, and, what is more, keep time like a clock.

"Whether the best English expresses ought to be as fast as the best American is a question we need not discuss. That, in fact, they are not as fast seems to me proved to demonstration. It is, therefore, I submit, not reasonable to say that American records are fallacious, because there are no English records to match them. . . .

"But, assuming American engines to make faster times than ours, 'Why,' you ask 'do they do it?' May I suggest, from a layman's point of view, some portion, at least, of the answer? That the American locomotive is in some respects superior as a vehicle I know, from the very practical test that it is possible, on an American engine, to write legible notes when traveling at 70 miles an hour and upward. On an English engine, so far as my experience goes, this is not possible. How much of the difference is due to the higher center of gravity in America, how much to the greater flexibility given by the bar frames and equalizing levers, or, again, to the superior elasticity of their chairless permanent way, I will not attempt to say. *Qua* motor, the American locomotive has the advantage that its much greater adhesive weight and tractive force enable it to accelerate its train much quicker. In other words, for a given weight to be hauled at a given speed, American practice provides a much greater reserve of power than English. Further, there is no doubt that American engines, extravagant fuel consumers though they doubtless are, can, with their huge grates, large heating surface and sharp draft, make steam more freely than ours. This must mean that they can fill and empty their cylinders without running short of steam faster than English engines could do.

"As far as I have seen, the maximum American and the maximum English speeds are very much the same. But in England seventy-five miles an hour and upward implies running down a bank, with steam quite or all but shut off; in America that speed is made with steam on—in other words, on a level or something very like it. Ten years ago Mr. Rous-Marten wrote that the ideal English locomotive would haul 150 tons on the level at 60 miles an hour. That ideal had hardly been attained then—it has been attained and passed now. But I do not think it will be claimed for any locomotive at present running in this country that it can maintain 70 miles an hour with 200 tons behind it on a dead level, and there are, I believe, a good many different types of engines which can do this in the States."

The Peerless Hose Nipple Cap.

The simple but ingenious little device shown in the engravings was invented by Mr. C. H. Dale, President of The Peerless Rubber Mfg. Co. In investigating the cause of failure of air brake hose it was ascertained that about 90 per cent. of the hose of all makes failed at the end of the iron nipple connecting the hose to the train pipe. Mr. Dale has been working for five or six years to overcome this and finally struck the idea of a cap for the nipple, and has been several years perfecting the device, as it was a more delicate job than would appear on the face of it, without making a change in either the nipple or hose.

The tests show that hose on an iron nipple covered with this rubber nipple cap will outwear by from 45to 55 per cent. the hose that is coupled on the iron nipple, owing to the friction being rubber in both hose and nipple as against the rubber lining of the hose and the end of the iron nipple.

The mechanical motion is what has ruined the hose by coming in contact with the harsh end of the iron nipple, but with this soft cushion at the end of the nipple the aforesaid objectionable features are overcome. In addition to this it makes a very tight packing for the joint. However, nothing is claimed for the packing portion of it, it is simply for the frictional contact that prolongs the life of any hose from 45 per cent. to 55 per cent.

The material is sold by the gross, and the patentee says it will increase the life of any hose. The Peerless Co. has the sole license to manufacture this cap in the United States. The nipple is covered by broad patents in the United States, Canada and Europe. The cost of these nipples is about 10 cents each.

The directions for use are simple simply place the cap on the end of the nipple or coupling, then cover the nipple with cement, and put the hose on as usual, either by hand or machinery. There is no more resistance than ordinary if the nipple is coated with rubber cement. This device in no way obstructs the flow of air.

Train Accidents in the United States in November.

COLLISIONS.

REAR.

2d, 1 a. m., on Pittsburgh, Fort Wayne & Chicago, near Baden, Pa., a passenger train broke in two, in front of the second car from the rear end. The foremost part of the train was soon afterward stopped and the rear portion ran into it, doing considerable damage to four cars. The two cars which broke loose were a track inspection car and a car carrying the baggage of a theater company. It is said that these cars had no air brakes and no automatic couplers. A brakeman riding in the theatrical car was badly injured.

4th, 2 a. m., on Lake Shore & Michigan Southern, at Ashtabula, O., a freight train stopped at the crossing of the New York, Chicago & St. Louis and was run into by a following freight. The conductor jumped off and was injured.

4th, on Baltimore & Ohio, near Fayette, Pa., a freight train which had become uncontrollable on a descending grade ran into the rear of a preceding freight, wrecking 18 cars. The engineman jumped off and was injured.

8th, on Duluth, South Shore & Atlantic, near Champion, Mich., a passenger train ran into the rear of a preceding freight, badly damaging several cars. The engineman was badly injured.

8th, on Nashville, Chattanooga & St. Louis, near Cowan, Tenn., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking 6 cars. The conductor was injured.

12th, 2 a. m. on Pennsylvania road, at Manor, Pa., a freight train ran into the rear of a preceding freight which had an engine at each end, making a bad wreck, blocking all of the main tracks. Two trainmen were injured.

13th, 11 p. m., on Toledo, St Louis & Kansas City, near Veedersburg, Ind., a freight train broke in two and the rear portion afterward ran into the forward one, derailing 11 cars, which fell into the ditch. One of the cars, which contained matches, took fire and with four others was burned up.

15th, on Lehigh Valley, at Lansdown, N. J., a freight train approaching the station at uncontrollable speed on a descending grade ran into the rear of a preceding milk train switching at the station, pushing the milk train violently forward. The engineman and fireman of this train had jumped off from the engine, and, the throttle being opened by the shock, the engine ran a Port Reading, 16 miles, uncontrolled, and was finally derailed there, an order having been sent by telegraph.

21st, on Boston & Albany, near West Pittsfield, Mass., an empty engine ran into the rear of a preceding freight which had been stopped in consequence of the breakage of a coupling, and the caboose was wrecked. The conductor was injured.

23d, on Buffalo, Rochester & Pittsburgh, near Golden, N. Y., a freight train broke in two and the rear portion afterward ran into the forward one, doing slight damage. One brakeman was killed and 2 were injured.

24th, on Lehigh Valley, at Mahanoy City, Pa., a freight train broke in two and the rear portion afterward ran into the forward one, damaging several cars. A brakeman was fatally injured.

24th, 10 p. m., on Chicago, Milwaukee & St. Paul, near Chicago, Ill., a passenger train ran into the rear of a preceding freight, badly damaging 5 freight cars. One employee was injured.

And 25 others on 19 roads, involving 3 passenger and 35 freight and other trains.

BUTTING.

1st, 5 a. m , on Pittsburgh & Western, at Ravenna, O., collision between a passenger train and a switching engine which was wrongfully using the main track, badly damaging both engines and breaking many windows in the passenger cars. The engineman of the switcher and 5 passengers and one trainman were injured

1st, on Pittsburgh, Cincinnati, Chicago & St. Louis, at Hartsdale, Ind., a passenger train ran over a misplaced switch and into the head of a freight train standing on the side track, badly damaging both engines and wrecking the baggage car and the smoking car. The wreck took fire and one passenger was somewhat burned. Six employees were injured.

6th, on Louisville, Evansville & St Louis, near New Albany, Ind., butting collision between an eastbound through freight and a westbound local. The fireman was injured.

6th, on Detroit & Lima Northern, near Cairo, O., butting collision between a northbound passenger and a southbound freight train, badly damaging the engines. The freight had encroached upon the passenger train's time, and a brakeman had been sent ahead with a red lantern, but it appears that the train followed him too closely. One report says that his light went out.

7th, on Philadelphia & Reading, near Catawissa, Pa., butting collision of freight trains, wrecking both engines and several cars. The engine fell down a bank into the Susquehanna River. One fireman was badly scalded.

10th, on Wabash road, at Hammond Junction, Ill., a passenger train of the Chicago & Eastern Illinois collided with a freight of the Wabash road, badly damaging both engines. Four passengers and 3 trainmen were injured. In consequence of a switch being out of order trains in both directions had to be run temporarily for a short distance over the same track, and it was on this track that the collision occurred.

15th, 1 a. m., on Fremont, Elkhorn & Missouri Valley, at Bordeaux, Neb., butting collision between an eastbound passenger and a westbound freight train, badly damaging both engines and several cars. It is said that the freight train was running on the time of the passenger train in consequence of the misreading of a telegraphic order. There was a blinding snowstorm at the time. The passenger train had been stopped before the collision. The engineman of the freight was injured.

16th, on Erie road, at Youngstown, O., butting collision between mixed train No. 105 and a yard engine. One passenger was injured.

22d, 3 a. m., on Wabash road, at Boody, Ill., butting collision between southbound freight train No. 91 and northbound freight No. 98, the latter drawn by two engines. The three engines were wrecked and two firemen were injured. It is said that the southbound train ran past a meeting point.

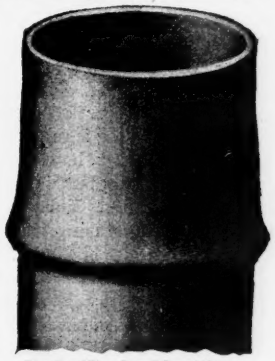
24th, on Chicago & Alton, near Mayview, Mo., butting collision between a westbound passenger train and an eastbound engine, badly damaging both engines and the baggage car. The engineman and 3 passengers were injured.

And 15 others on 15 roads, involving 3 passenger and 27 freight and other trains.

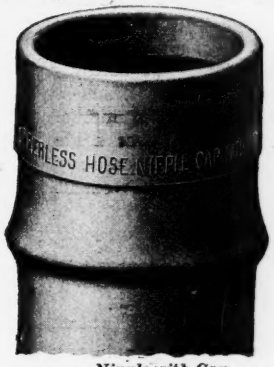
CROSSINGS AND MISCELLANEOUS.

1st, on Chicago & Northwestern, at Aurora, Ill., a passenger train collided with a freight, which was switching on the main track without authority, badly damaging both engines. Four trainmen were injured.

4th, on Philadelphia & Reading, at Topton, Pa., a passenger train ran over a misplaced switch and into a side track, badly damaging an engine standing there. Three trainmen were injured.



Brake Nipple without Cap.



Nipple with Cap.

The Peerless Hose Nipple Cap.

5th, 4 a. m., near Harney street, Omaha, Neb., collision between a Burlington and a Union Pacific engine, derailing both engines and throwing one of them down a bank. Both enginemen were injured.

6th, on Santa Fe Pacific, near Grants, N. M., a passenger train was attacked by robbers while at a water station, and the fireman was compelled to run the foremost part of the train some distance ahead to give the robbers a chance to work. Dynamite was used on the express car and one safe was emptied of a large quantity of specie. After the robbery the fireman ran the engine and the express car back to the rear part of the train, and forgetting the exact situation of the passenger cars, ran into them so violently as to overturn a stove and set the car afire, and three cars were burned up.

8th, on Cleveland, Cincinnati, Chicago & St. Louis, at Bellefontaine, O., collision between a gravel train and a yard engine, badly damaging both engines. One engineman and 2 other employees were injured.

11th, 4 a. m., on Louisville, Henderson & St. Louis, near Lewisport, Ky., a passenger train ran into a freight car which had been blown out of a side track by a high wind, and the engine, tender and first car of the train were overturned. The stove in one of the cars set fire to the wreck and 3 passenger cars were burned up. A few passengers were slightly injured.

14th, on Ohio River road, near Wheeling, W. Va., collision between a passenger train and a freight, badly damaging the passenger engine. The engineman and fireman were badly injured.

16th, on New York Central & Hudson River, at North Tonawanda, N. Y., collision between a northbound passenger train of the New York Central and a southbound passenger train of the West Shore, damaging one passenger car. Two passengers were slightly injured.

17th, on Erie road, at Sharon, Pa., collision between a locomotive and a portion of a freight train, doing slight damage. The fireman, who was cleaning the front end of the engine, was killed.

And 21 others on 18 roads, involving 5 passenger and 32 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

5th, on Nashville, Chattanooga & St. Louis, near Memphis, Tenn., a switching freight train was derailed by spreading of rails and a brakeman was badly injured.

17th, on Gainsville, Jefferson & Southern, near Hoschton, Ga., a freight train broke through a bridge which had been weakened by a flood, and several cars were wrecked. One trainman was killed and 4 injured.

23d, on Chicago, St. Paul, Minneapolis & Omaha, at River Falls, Wis., a freight train was derailed by a broken rail and 6 loaded cars were wrecked. Two men riding in one of the cars in charge of freight were injured.

27th, on New England road, at Allendale, R. I., a car in a passenger train was derailed by a broken rail and overturned. Eight passengers were injured.

And 4 others on 4 roads, involving 4 freight trains.

DEFECTS OF EQUIPMENT.

4th, on Lehigh Valley, at Bound Brook, N. J., a car in a freight train was derailed by a broken truck and fell across the adjoining main track. A freight train approaching a moment afterward ran into the wreck and the engine and 17 loaded cars were derailed. The engineman was killed and two other trainmen were injured, one probably fatally.

4th, on Chesapeake & Ohio, near Charlottesville, Va., an eastbound passenger train was derailed by the breaking of an axle on the forward truck of the engine, and the engine and first two cars fell down a bank into the Rivanna River. The train was running rapidly and the first two cars were badly wrecked. Four passengers and one trainmen were killed and 12 passengers and 4 employees were injured.

14th, 5 a. m., on Kansas City, Memphis & Birmingham, near Ash Grove, Mo., a freight train was derailed by a fallen brakebeam and 7 loaded cars were wrecked. The wreck fell upon a cabin occupied by the wife and two daughters of a track watchman and one of the women was injured. Another one was nearly suffocated by being buried in a mass of wheat.

20th, 2 a. m., on Baltimore & Ohio, at Duffields, W. Va., several cars in a freight train were derailed and fell against another freight train which at the time was passing on the adjoining main track. One brakeman was killed. The derailment was caused by the automatic application of the air-brakes, in consequence of the breakage of a coupling and the crowding of the cars by a pushing engine after the brakes were applied.

And 19 others on 18 roads, involving 1 passenger train and 19 freight and other trains.

NEGLIGENCE IN OPERATING.

10th, 5:30 p. m., on Chicago & Northwestern, near the Wells street station, Chicago, a passenger engine (without a train) ran into an open draw and was partially submerged in the river. The fireman was stunned and was drowned. The engineer was badly injured.

12th, on Beech Creek road, at Patton, Pa., a freight train which had become uncontrollable on a descending grade was derailed at a switch and 22 cars were wrecked. The engineman was killed and the fireman was injured. It is said that the train had broken in two on a long and steep grade, and that the engineman had increased his speed in order to try to prevent a collision.

23d, on Seattle & International, near Blackman's, Wash., a freight train which had been left standing on a grade, while the engine went some distance to take water, was insufficiently braked, got away from the brakemen who were in charge of it, and ran away backward down grade. It broke into three parts; the foremost part ran off the track at Blackman's and the caboose fell against some lodging cars occupied by workmen. One of the men in these cars was injured. Another part of the train was derailed and wrecked near Cathcart.

27th, on Louisville & Nashville, near Winchester, Ky., a freight train broke through a trestle bridge and 23 loaded cars fell 65 ft. to the bottom of the ravine. Two bridge carpenters at work beneath the bridge were killed. It is supposed that the train was derailed in consequence of the failure of the repair men at work on the surface of the trestle to properly block up the track.

29th, on Santa Fe Pacific, near McLellan, Ariz., a freight train, which became uncontrollable on a descending grade, was derailed, and the whole train, consisting of 25 loaded cars, one empty car and 2 locomotives was wrecked. A large portion of the wreck was burned up and 2 enginemen and 1 fireman were killed and their bodies were partially consumed by fire. The other fireman was injured and the conductor was slightly hurt.

And 7 others on 7 roads, involving 7 freight trains.

UNFORESEEN OBSTRUCTIONS.

7th, 11 p. m., on Louisville & Nashville, at Biloxi, Miss. a passenger train struck a horse and threw him against a switchstand in such a way that the switch was partially opened and the baggage car and 2 passenger cars were derailed.

9th, on Philadelphia, Wilmington & Baltimore, near Cambridge, Md., a passenger train was derailed by a tree which had been blown down upon the track and the fireman was injured.

9th, on Texas & Pacific, near Benbrook, Tex., a car in a freight train was derailed by a timber which repairmen had left lying too near the track and 5 cars fell down a bank. The fireman and one brakeman were injured.

12th, on Chicago, Rock Island & Pacific, at Renfrow, Okl., a freight train was derailed by running over a cow and the engine and 12 cars were wrecked. The engineman jumped off and was killed and the fireman was injured.

19th, 6 p. m., on Chicago & Eastern Illinois, near Coal Bluff, Ind., a passenger train ran over a horse and two cars, filled with miners, fell down a bank and lodged in a ditch filled with water to the depth of several feet. Twenty-three passengers were injured, 3 probably fatally.

20th, 4 a. m., on Erie road, at Sloatsburg, N. Y., westbound fast freight train No. 79 was derailed at a point where the rails had been maliciously loosened, and the engine and two cars fell upon the eastbound main track. The fireman was injured.

20th, on Northern Pacific, near Bitter Root, Mont., a freight train was derailed on a trestle by running over a horse and 5 cars of gasoline were wrecked.

23d, 9 p. m., on Northern Pacific, near Lester, Wash., a passenger train drawn by two engines was derailed by a tree which had fallen across the track and both engines fell into the river. The mail car was wrecked. One engineman and one fireman were badly scalded.

30th, on Atlantic & Danville, near Gill's, Va., a passenger train was derailed by a loose plank at a highway crossing and the engine, baggage car, mail car and 2 passenger cars fell down a bank. The engineman and fireman were killed. The plank was loosened and thrown across the rail by a wagon which crossed the track just before the passenger train came along.

And 2 others involving 1 passenger train and 1 freight

UNEXPLAINED.

2d on Kansas City, Memphis & Birmingham, at Carbon Hill, Ala., a freight train was derailed at a switch and the engine was ditched. The engineman and a pumper riding on the engine were badly scalded and the fireman was less severely hurt.

5th, on New England road, near Bolton, Conn., a freight train was derailed and the engine fell down a bank. The engineman was injured.

7th, on Pittsburgh, Fort Wayne & Chicago, at Conway, Pa., a car in a freight train was derailed and

(*Continued on page 932.*)

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Reports from all of the contracting locomotive shops show that in the year 1897, 1,251 locomotives were built. This is a gain, although a small one, (less indeed than we had expected) over the preceding year, when 1,175 were built. In 1895 the engines built by these shops amounted to 1,101 in number and in 1894 to only 695. That was the lowest output recorded for a considerable number of years, and even in 1897 the number of locomotives built has not got back by a good deal to what it was before the panic of 1893. In that year 2,011 locomotives were built, the year before 2,012, and in 1891, 2,165. Of course the reader will understand that these are the engines built by the contracting shops and not by the railroad shops. In fact, it is impracticable ever to ascertain the number of locomotives built in any one year in the United States at the railroad shops. The best that can be done is to get in course of time the *net* increase in locomotives from the statistics collected by Poor and by the Interstate Commerce Commission, but even those do not give the number built; they are net figures. Of the 1897 locomotives 143 were compounds, or 11 per cent. of the total. Out of the 1,251 locomotives built in 1897, 386 were built for export. In 1896 the same companies reported 309 as built for export; that is, in 1897, 31 per cent. of the total was ordered for export, and in 1896, 26 per cent. It will be observed that this export business is important and growing. The government reports of locomotives exported for the fiscal years ending June 30, give, in 1887, 58 in number and $373,245 in value. These increased in number and in value to 1891, when the number exported was 275, and their value was $2,424,363. For the next three years the export fell off, but in 1895 it began once more to gain, and in that year the number ran up to 252 and the value to $2,379,519. In 1896 (year ending June 30) the exports of locomotives amounted to 261 in number and $2,512,270 in value. In the ten months of the calendar year, including October, the locomotive exports in 1896 were $2,666,000, and in 1897 they were $2,750,000 in value.

Car Building in 1897.

Official reports from 30 contracting car building companies and estimates from 5 others show that the number of freight cars built in the year 1897 has aggregated 43,588, which is considerably less than the number built in 1896, namely, 51,189. In 1895 the total built was 38,100 and in 1894 it was only about 18,000. In 1890, the best year for car building, so far as our records show, the output of freight cars was 103,000, but in each of the years 1891 and 1892 there were built nearly 100,000. It will be seen, therefore, that the year just ending has not been a very prosperous one for the contracting car builders as compared with any recent years, excepting the two or three years of the silver panic.

We find among the companies reporting one which built over 7,500 cars and three others which built each more than 5,000. There are four companies building between 1,000 and 2,000 and each of the remaining companies has built but a few hundred, most of them less than 500. The average built by all of the companies reporting and estimated is 1,282 per company.

We find that these same companies have built 494 passengers cars, or 20 more than they built in 1896 and 64 more than in 1895. This again is a poor showing as compared with the early years of this decade, when the output ran from 1,500 up to 2,300 passenger cars per annum.

We have reports this year for the first time of street railroad cars to the number of 2,107. This, however, is certainly much below the number actua ly built, for our reports come from very few concerns outside of those which build steam railroad cars as the most important part of their work. We have no reports from the larger street car builders.

Two of the largest builders of steam railroad cars have declined to report and we have been obliged to estimate their product, which, however, we think we have been able to do pretty closely.

We judge from the estimate of probable equipment requirements printed elsewhere that the year 1898 will be a much better one for the car builders than the year just passed, barring foolishness at Washington, or other unexpected condition which may upset predictions and destroy the present favorable outlook. It is hardly to be expected, however, for many reasons which we have considered in past years, that the number of freight cars built per annum will ever again be as great as in the early nineties. The capacity of the individual car is greater; the movement of cars is prompter and faster; the loading is more carefully watched. For these reasons more service is got out of a given number of cars. Doubtless the life of the modern car is longer, and furthermore there are fewer miles of new road to equip.

Equipment Requirements.

We have tried to forecast the demands for equipment for the next half year and have received an astonishing number of answers to our questions, and we take this occasion to thank the officers of the railroads for the trouble that they have taken. We have received information as to the locomotives and cars which will probably be wanted within the next six months, from railroads which own a total of 899,000 freight cars. Of these, railroads owning a total of 810,000, or 67 per cent. of the total freight car equipment of the country, give definite answers, saying that they will or will not require cars in the next half year and saying how many. These railroads will need a little over 24,000 freight cars. If we assume that those who have not answered at all will need cars in the same ratio, this will call for 36,000 freight cars. Perhaps we may add to this 2,000 for new roads to be completed and put in operation within that half year which, probably, is a moderate allowance. This would give an estimate of 38,000 freight cars which will be required within the next half year. This is within 13,000 of the total number of freight cars built by the contracting shops in the *entire year* of 1896, and it is equal to the number built by those shops in the year 1895.

The railroads from which we have definite replies own 65 per cent. of all the locomotives owned in the United States, and they require 243 engines; from which we assume that all of the railroads will require 360, and if we add 40 locomotives for the new railroads in the half year we shall have 400 engines, which is nearly half as many as were built either in 1896 or 1897 by the contracting shops, for the home market.

The railroads which have answered definitely say also that they will require 174 passenger and baggage cars in the next six months; and they tell us further that 40 of the locomotives, 2,080 of the freight cars and 10 of the passenger and baggage cars will be built at the railroad shops. Since these replies were received orders have been placed for 55 of the locomotives and 6,350 of the freight cars.

Aside from the figures given above we hear from railroads in Canada with a total equipment of 560 locomotives and 18,850 freight cars, that they will need 44 locomotives, 1,040 freight cars and 71 passenger and baggage cars in the next half year. Of these, 40 locomotives, 1,000 freight cars and 40 passenger cars will be built by the railroads; and since our answers were received an order has been placed for 20 of the passenger cars and 15 of the locomotives. From two Mexican railroads with a total equipment of 126 locomotives and 248 freight cars, we hear that they will need seven locomotives, 250 freight cars. Six Mexican roads representing a very much larger ownership than those mentioned above, answer that they will need no rolling stock, which is also the case with Canadian roads with an ownership of nearly 28,000 freight cars.

Of course the figures which we have given above are only approximate, but we judge that they give a pretty good measure of the equipment requirements, and certainly they ought to be encouraging to the makers of all sorts of equipment and rolling stock supplies. They will absorb, for instance, 38,000 sets of couplers in the half-year, and it is probable that pretty nearly all of those couplers, if not all, will be of the M. C. B. type; and undoubtedly there will be many sets of airbrakes used on these cars, for it is not to be supposed that the time for equipping will again be extended.

Railroad Building in 1897.

Reports received by the *Railroad Gazette*, up to the time of going to press, indicate that the building of new railroads in 1897 was a little less than for the year before and a few miles more than the total reported for 1895, though still far short of that in 1890 and earlier years. Official reports from the various companies show a total mileage built during the year, not including second track and sidings, of 1,604.17 miles. To this must be added 223.75 miles, which the news columns of the *Railroad Gazette* show to be completed by the close of the year, giving us 1,827.92 miles pretty accurately verified. There are a number of roads on which it is known that grading has been completed, and tracklaying is in progress. The exact amount of tracklaying, however, it is impossible, at this time, to state, but it is estimated to be not less than 110 miles. This makes the total probable railroad building during 1897, 1,937.92 miles, of which all but 333.75 miles is official. Of course reports from roads not yet heard from will somewhat modify these results. We give below the official and estimated mileage by states, omitting, however, the 110 miles, which has probably been completed, but of which we have no definite record.

NEW RAILROAD BUILDING IN 1897.

States.	Official.	Estimated.	States.	Official.	Estimated.
Alabama	114.	.....	Missouri	61.7	31.5
Arkansas	84.5	.....	Montana	13 9	.....
California	169.06	23.	New Jersey	10.	.....
Colorado	35.33	.....	New York	27.02	.....
Delaware	.....	25.	North Carolina	47.38	5.
District Columbia.	2.	.....	North Dakota	36.29	.....
Florida	1.	.....	Ohio	.28	5.
Georgia	73.45	21.	Oklahoma Ter.	27.	.....
Idaho	2	.....	Oregon	31.	.....
Illinois	105.85	11.	Pennsylvania	142.09	.....
Indian Terr.	.8	.....	South Carolina	10.5	.....
Iowa	...	8.	Tennessee	15.	.....
Kansas	1.73	.....	Texas	80.95	16.5
Kentucky	8.35	12.	Vermont	.....	3.25
Louisiana	129.5	.....	Virginia	19.65	.....
Maine	19.35	.....	West Virginia	51.5	.....
Massachusetts	5.26	.....	Wisconsin	62.8	28.
Michigan	98.71	27.			
Minnesota	38.3	4.5	Totals	1604.17	223.75
Mississippi	55.9	.....			

The 110 miles of probable new road, not included in the above, is distributed as follows: Arkansas, 12 miles; California, 18; Georgia, 36; North Carolina, 10; Ohio, 10; Oklahoma Territory, 11; Tennessee, 12, and West Virginia, 8 miles.

It is interesting to make comparisons with previous years. According to Poor's Manual, which appears about six months after the close of the calendar year, and is therefore in position to gather up practically all the construction of the year, the new building for 1896 was 1,996.72 miles, or about 59 miles more than the total estimate here given for 1897. In 1895, which is the low-water mark in railroad construction, the mileage was 1,922.25. Poor puts the new construction in 1894 at 2,263.97 miles; in 1893 at 2,789.02 miles; in 1892 at 4,584.01 miles; in 1891 at 4,620.41 miles, and in 1890 at 5,656 7 miles.

The line which has built the most road during the past year is the Kansas City, Pittsburgh & Gulf, which has completed its entire line from Kansas City to the Gulf of Mexico. Including the road built for this company by other lines now absorbed into the system, this company has built in Arkansas, 53 miles; in Louisiana, 122 miles; in Texas, 28 miles; and in Missouri, 66.5 miles, making the total for the year 269.5 miles.

Among other roads building during the year is the Mobile, Jackson & Kansas City, which has built 30 miles in Alabama and 7 miles in Mississippi, a total of 37 miles. The Mobile & Ohio has built 72 miles on its extension to Tuscaloosa, of which 63 miles is in Alabama and 9 in Mississippi. The St. Louis, Peoria & Northern has built 58½ miles in Illinois. In California the San Francisco and San Joaquin Valley has completed 118 miles, and the Sierra 42 miles.

In the East the chief railroad built has been by the Pittsburgh, Bessemer & Lake Erie, which has com-

pleted 43 miles, from Butler to Bessemer, and is relaying its entire track northward, from Butler to Lake Erie.

The figures so far received indicate that California heads the list with 199 miles of new road, while Alabama, Georgia, Louisiana, Michigan, Missouri, Pennsylvania and Texas have each more than 100 miles to their credit.

November Accidents.

Our record of train accidents in November given in this number includes 92 collisions, 111 derailments and 8 other accidents, a total of 211 accidents, in which 31 persons were killed and 191 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

COLLISIONS.	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two	17	6	1	18
Misplaced switch	0	2	2	4
Failure to give or observe signal	2	4	2	8
Mistake in giving or understanding orders	0	3	0	3
Miscellaneous	7	3	7	17
Unexplained	11	13	18	42
Total	37	25	30	92

DERAILMENTS.			
Broken rail	3	Careless running	1
Loose or spread rail	2	Track repairers	2
Defective bridge	2	Runaway train	4
Defective switch	1	Open draw	1
Broken wheel	5	Animals on track	5
Broken axle	9	Landslide	1
Broken truck	4	Malicious obstruction	1
Fallen brakebeam	1	Accidental obstruction	4
Broken car	2	Unexplained	57
Broken drawbar	2		111
Misplaced switch	4		

OTHER ACCIDENTS.	
Boiler explosion	1
Broken side rod	3
Cars burned while running	2
Other causes	2
	8
Total number of accidents	211

A general classification shows:

	Collisions.	Derailments.	Other accid's.	Total.	P. c.
Defects of road	0	8	0	8	4
Defects of equipment	18	23	5	46	21
Negligence in operating	32	12	2	46	21
Unforeseen obstructions	0	11	1	12	5
Unexplained	42	57	0	99	49
Total	92	111	8	211	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other accid's.	Total.
Passenger	28	18	2	48
Freight and other	133	98	6	237
Total	161	116	8	285

The casualties may be divided as follows:

Killed:	Collisions.	Derailments.	Other accid's.	Total.
Employees	3	18	2	23
Passengers	0	8	0	8
Others	0	0	0	0
Total	3	26	2	31
Injured:				
Employees	42	42	1	85
Passengers	19	80	4	103
Others	0	3	0	3
Total	61	125	5	191

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road	0	10	1	5
Defects of equipment	4	16	5	7
Negligence in operating	0	19	10	47
Unforeseen obstructions and maliciousness	3	20	3	9
Unexplained	1	38	4	17
Total	8	103	23	85

Twenty accidents caused the death of one or more persons each, and 45 caused injury but not death, leaving 146 (69 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with November of the previous five years shows:

	1897.	1896.	1895.	1894.	1893.	1892.
Collisions	92	49	80	59	92	106
Derailments	111	54	62	84	101	84
Other accidents	8	4	4	3	7	9
Total accidents	211	107	146	146	200	199
Employees killed	23	10	38	17	43	44
Others killed	8	4	8	5	28	17
Employees injured	85	41	87	47	108	103
Others injured	106	14	82	19	87	96
Passenger trains involved	48	29	49	44	66	75
Average per day:						
Accidents	7.03	3.57	4.87	4.87	6.67	6.63
Killed	1.03	0.47	1.53	0.73	2.37	2.03
Injured	6.37	1.83	5.63	2.20	6.50	6.63
Average per accident:						
Killed	0.15	0.13	0.32	0.15	0.35	0.30
Injured	0.91	0.51	1.16	1.45	0.97	1.00

The accidents in which passengers were killed were those at Charlottesville, Va., on the 4th; at Williford, Ark., on the 18th, and at Coal Bluff, Ind., on the 19th. The first named was reported in the *Railroad Gazette* of Nov. 12. The fire in the Williford accident was reported in some of the newspapers as being due to the ignition of illuminating gas, but an officer of the road informs us that it was started by coals from the stove. What was apparently one of the worst passenger train accidents of the month, that near Lewisport, Ky., on the 11th, appears to have resulted in no serious injury to any person, but practically all the combustible portion of the train was burned up. There was a third passenger train accident in which "the car stove" figured, that at Grant's, N. M., on the 6th.

The most notable freight train accidents in this record were those at Louisville, Ky., on the 9th; at Winchester, Ky., on the 27th, and at McLellan, Ariz., on the 29th. The drawbridge accident at Chicago on the 10th seems to have been due to unaccountable carelessness on the part of the engineman, as the signals are reported to have been suitable, and correctly set.

A press dispatch from Colorado Springs Nov. 8 states that on the Colorado Midland a butting collision between a passenger train and an empty engine was avoided, the previous day, by the fact that the trains met on a straight line. The engineman of the empty engine had a watch, lent him by a Leadville jeweler while his own was being repaired, which lost 18 minutes in a short time. As both trains were going at good speed and the road is not very straight there was a good chance for a disastrous collision. The fireman evidently had no watch, or might as well have had none. If the rule requiring conductors and enginemen to check one another's watches is worth having, and enforcing, in the management of ordinary trains, why should not the engineman be checked by the fireman when an engine is run without a train and there are only these two men along with it? Surely we do not want any firemen in the service who lack the intelligence to perform this simple duty; and if the men are competent their service ought to be availed of.

It will be observed that the number of accidents this month is very large, as compared with any preceding month for four years. The number of persons killed however, is not unusual. The average number of persons killed in November for the past five years has been 43, and the average number of persons killed per accident in November during the past five years has been 0.26, from which it would appear that the increase is in the less disastrous classes of accidents. The percentage of accidents in which no personal injury incurred (69) is 6 more than the average percentage for the last year. The increase in the total may be accounted for by the well-known fact that freight business has been heavy of late on a great many roads. This necessitates heavy trains, the employment of additional trainmen, some of them inexperienced, and the working of all trainmen long hours. Whether or not these circumstances account for the fact that the increase over November, 1896, both in train accidents and in fatal personal accidents, is about 100 per cent., it would be difficult to say. It hardly seems likely that the train mileage has increased in that ratio.

We find reports of only four electric car accidents in November. Three of these did very little damage, only two persons being injured; but the fourth, a butting collision near Baltimore on the 21st, resulted in the killing of both motormen and the injury of six other persons. One of the cars was a "special," and it met the other, a regular, in a hollow, making a very bad wreck. There was a dense fog at the time. The motorman of the special, finding that he had four minutes to spare at the last preceding sidetrack, thought he would try to reach the next meeting point; again illustrating how such processes of "thought" often result.

Locomotive Speeds in England and in America.

On another page we print a letter from Mr. Acworth to the editor of *The Engineer*, giving among other things the log of a train by which he went from Philadelphia to Atlantic City. When Mr. Acworth stepped out of the cab he said: "There is not an engine in Great Britain which could do that, but they will think I am lying when I tell them." Obviously, his reputation in his own country is better than he supposed, for the editor of *The Engineer* on another page of the issue in which the letter appears says: 'If our information is correct, and we think it is [!], velocities are attained and maintained with ease on the other side of the Atlantic, in the regular way of business, which are only reached in this country so rarely that they are regarded as manifesting something of the miraculous." It is true that the editor "rejects the official statements as loose and of no scientific value whatever," but he does accept the figures given by some of his English correspondents. He adds then:

On a careful review of all the available information which we have been able to obtain—much of it the result of direct correspondence with authorities in the United States—we have arrived at the conclusion, as stated in our last impression, that American locomotives, albeit they do not attain the imaginary speeds attributed to them by ignorant newspaper reporters, do, as a matter of fact, in some cases run faster than any English locomotive has ever done; and that train speeds—which is a different matter from locomotive speeds—are sensibly higher on some of the first-class railroads than anything we can manage with certainty and regularity in this country. But it will not do to let the subject drop at this stage. If passengers are transported from place to place at much higher speeds in the United States than in this country, we want to know the reason why.

Observe that *we* want to know the reason why. There is but one other man on the face of the earth who takes himself so seriously, viz., the German Emperor, or Herr Müller, as the Germans call him when they want to question his heaven-given wisdom without fear of prison.

We are pleased to discover that in all the contention which has taken place over this subject it has been the aim of this Herr Müller of the press to get at the truth. He says: "If our readers have followed us thus far they will now see the point at which we have been aiming all along." Perhaps they will see it and perhaps they will not. They will not if he can help it, for he uses up two columns of space in trying to mitigate and qualify his handsome action in admitting at last that a very considerable number of people of very excellent reputation who have made definite statements to him with regard to recorded facts are not all liars, and in admitting that he has been mistaken in certain theoretical contentions which he has set up against these facts.

"But," he says, "it was first of all necessary to settle what was true, but out of the mists we have succeeded in drawing the fact that American engines really do run faster than English locomotives. The next point to be settled is, as we have said, the speed capacity of English engines." He is now distressed to know just why American locomotives run faster than English locomotives. We shall not try to answer that question. Too much information all at once might produce an intellectual indigestion, and we will let him thoroughly assimilate the facts which Mr. Acworth and others have contributed before we undertake to account for those facts. We suspect, however, that ton for ton, the English locomotive *can* run just as fast as the American, in general. There may be a few speedy individuals on both sides of the Atlantic that will have to be specially accounted for.

The verdict of $21,666 against the Chicago & Northwestern for blacklisting F. R. Ketcham, a conductor who was among the strikers in June, 1894, is the subject of a long article in the *Outlook*, by Ray S. Baker. The article is carefully written, and the subject seems to have been treated in a temperate spirit. In the main the facts given are the same as those already reported in the daily papers. There seems to be no doubt that Ketcham had been refused employment on a number of roads in consequence of his connection with the strike, but the question as to whether blacklists were exchanged between different railroads hinges on the testimony of one person, Norman Ford, a clerk in the office of the Illinois Central. That road made a list of 524 names of men who were not to be employed until after a consultation with the head of the department under which th were last employed. This list, obviously, was intended for the officers of different divisions of the Illinois Central, but Ford testified that he mailed copies of it to every railroad having offices in Chicago. So far as appears, every railroad officer called to testify, except those of the Illinois Central, denied knowledge of the list. There was testimony to the effect that a fireman who had been honorably discharged from the Chicago & Northwestern was going to be summoned to testify in behalf of Ketcham, and that when this fact was found out by certain officers of the Northwestern they tried to get him to leave Chicago by offering him a pass and other inducements. Mr. Baker's article still leaves the reader in the dark as to whether the Illinois Central officers knowingly permitted copies of their list to be sent to other roads, and if they did whether such action was taken on their own motion, or in response to requests from officers of other roads for information concerning specified individuals. Neither does it appear from this or any other report whether Illinois Central officers were questioned by the Court on this point. And even if the Illinois Central did persecute Ketcham, it is difficult to see why the Chicago & Northwestern should suffer for it to the extent of $21,000. The case has been appealed, but that may not mean any further elucidation of the evidence. The essential question at issue is whether or not there was a conspiracy. If an officer of the Burlington or the Rock Island, for instance, should ask the Superintendent of the Illinois Central whether Ketcham was a desirable person to employ, it would be natural to give an honest answer, and the officer so answering would be doing what business men are doing everywhere every day. And if similar answers were given concerning 500 men, still it would be hard to see where anything like conspiracy would come in. A jury, however, is pretty likely to look upon a blacklist sent by a general superintendent to his division officers as precisely like a malicious blacklist sent to another employer, and it devolves upon the judge to show the jury its error. It would be interesting to see published the charge of the trial judge in this case.

NEW PUBLICATIONS.

American Railway Management. Addresses delivered before the American Railway Association, and Miscellaneous Addresses and Papers. By Henry S. Haines, formerly Vice-President and General Manager Plant System, Ex-President American Railway Association, etc., etc. Pages, 372; 12mo. New York: John Wiley & Sons. London: Chapman & Hall, Limited. Price, $2.50.

Colonel Haines has been unusually productive in the literature of his profession, if the reader will allow us to call railroading a profession, and if we may further speak of addresses and occasional speeches as literature. He explains in his preface that the addresses here collected have been for the most part produced upon the spur of the moment, as opportunities offered during a busy life, but that nevertheless some of them contain information gathered from various sources which cannot be so readily obtained elsewhere. In fact, they contain more than that. They contain the judgments and suggestions of a man who has been in the thick of railroad work for many years and who has

been diligent and studious and has kept an open mind through the exigencies of practical life. Of course many of these addresses have been heard or read, at least by abstract, by many of our readers; but for that reason they will probably be all the more glad to see them collected in a volume handy for reference and made accessible by a capital index of 28 pages. It is a pity that more railroad men do not take the time and trouble to put on record and make available their knowledge and opinions, and Colonel Haines deserves the thanks of the calling for having done his part toward building up a literature for the student of to-day and for the man who a hundred years from now will look back upon one of the most interesting episodes in the history of mankind, the application of steam power to transportation.

Train Accidents in the United States in November.

(*Continued from page 929.*)

fell down a bank. A boy riding on the car was badly injured.

7th, on Sedalia, Warsaw & Southwestern, near Warsaw, Mo., a mixed train was derailed and fell down a bank. The engineman was killed and one passenger and 3 trainmen were injured.

9th, 1:45 a. m., on Illinois Central, at Louisville, Ky., a car in a freight train was derailed and ran against one of the supports of the train shed at the passenger station and weakened it so that a part of the roof fell. Four freight cars were wrecked and the roof was damaged about $10,000.

17th, on Cleveland, Canton & Southern, at Summit, O., a passenger train was derailed and 2 passenger cars were overturned. Three passengers were slightly injured.

18th, 3 a. m., on Kansas City, Fort Scott & Memphis, near Williford, Ark , passenger train No. 2 was derailed and one passenger car fell into Spring River. The chair car took fire from the stove and, with the sleeping car, was burned up. One passenger was fatally injured, and about 30 slightly. The engine and first three cars were not derailed.

18th, on Norfolk & Western, near Wilsondale, W. Va., a freight train was derailed and badly wrecked. A portion of the wreck took fire and was consumed, and the engineer was fatally burned. A brakeman was injured.

20th, on Oregon Railroad Navigation Line, near Bonneville, Or., a boarding car in a freight train was derailed and the matron of the car, who attempted to jump off, was badly injured.

20th, on Kansas City, Memphis & Birmingham, near Arcadia; Mo., a freight train was derailed and several cars were ditched. The engineman was injured.

22d, 4 a. m., on Louisville & Nashville, at Birmingham, Ala., several cars of a freight train were derailed and ran against two watchmen's cabins, knocking them down. Four employees in the cabins were injured.

22d, on Norfolk & Western, near Shawsville, Va., a freight train was derailed and 14 cars fell down a bank. A part of the wreck took fire and was burned up. The engineman was killed and several other trainmen were injured.

22d, on New York Central & Hudson River, at Buffalo, N. Y., 2 sleeping cars in a passenger train were derailed and one of them was overturned. One passenger was injured.

26th, on Baltimore & Ohio Southwestern, at Pierceville, Ind., a passenger train was derailed and 3 cars were overturned. Several passengers were injured.

And 43 others on 33 roads, involving 4 passenger and 39 freight and other trains.

OTHER ACCIDENTS.

9th, 1 a. m., on Burlington & Missouri River, near Crawford, Neb., the locomotive of a freight train was wrecked by the explosion of its boiler, and the engineman and fireman were killed.

11th, on Rome, Watertown & Ogdensburg, at Syracuse, N. Y., an engine was considerably damaged by the breaking of a parallel rod. The engineman was injured.

20th, 3 a. m., on Erie road, near Binghamton, N. Y., a car in the Wells-Fargo express train caught fire and, with its contents, was mostly destroyed.

21st, 10 p. m., on Atchison, Topeka & Santa Fe, at Wakarusa, Kan., a car of cattle in a freight train took fire, evidently by sparks lodging in the bedding of the cattle, and, with its contents, was burned up.

24th, on Illinois Central, at De Koven, Ky., a car in a passenger train was badly damaged by the explosion of a steam-heating pipe and 4 passengers were injured.

And 3 others on 3 roads, involving 1 passenger train and 2 freights.

A summary will be found in another column.

TECHNICAL.

Manufacturing and Business.

A. M. Castle has been appointed Western Sales Agent of the Oval Brake Beam Co., of Philadelphia, with office at 9 South Canal street, Chicago, Ill.

The Q & C Company, Western Union Building, Chicago, Ill., has arranged with the National Railway Specialty Co. to manufacture on license its rear edge protecting strip, which will be known as the N. R. S. protection strip.

The sale of the plant of the Rhode Island Locomotive Works, under trustee mortgage sale, set for Dec. 23, has been adjourned until Jan. 6. The mortgage is for $300,000.

J. A. Fay & Co., of Cincinnati, O., have received a contract to furnish all of the machinery for the woodworking department of the new shops of the Cincinnati, Hamilton & Dayton Railroad, now being built at Lima, O., and described in previous issues.

The Carolina Midland is in the market for 700 tons of 60-lb. rails.

The E. T. Burrowes Co., of Portland, Me., has engaged J. M. Denniston, formerly with the St. Louis Car Co., to represent it in its car curtain department.

The Lidgerwood Manufacturing Co., of New York City, builders of the Lidgerwood hoisting engines, cableways and conveying devices for contractors and others, has placed its Southern agency with Woodward Wight & Co., Ltd., of New Orleans, La. With this connection and J. H. Dickenson as its engineer in charge of all specifications and orders, the Lidgerwood Mfg. Co. insures its customers prompt and satisfactory service in filling orders.

Henry H. Sessions, formerly Manager of Pullman's Palace Car Co. works, at Pullman, Ill., and for many years connected with prominent railroads as Master Car Builder, has been elected Vice President and a Director of the Standard Coupler Co. Mr. Sessions will have an office at 522 Monadnock Block, Chicago, and will give special attention to the Standard steel platform, which was designed by him, and which is owned by the Standard Coupler Co.

The Davis & Egan Machine Tool Co., of Cincinnati, O., has received through its Paris office an order for a number of large planers from the Cie. Hautes Fourenaux Forges et Acieries, St. Chaumond Department, Loire, France. This company is one of the largest in France, producing marine and railroad equipment. The Davis & Egan Co. has also received through its Paris office another order from Puteaux Government Works, Puteaux, France.

Ten of the 16 new open-hearth furnaces and the new girder rail mill of the Carnegie Steel Co. will be put in operation next month. It is stated that the company will also build a large universal plate mill at Homestead.

At a meeting of the stockholders of the P. L. Kimberly Iron Co. at Sharon, Pa., last week, it was decided to issue bonds to the amount of $125,000, of which amount $25,000 are to be used for repairs.

The Pennsylvania Tin Plate Co., of New Kensington, Pa., has finished the additions to the hot and cold mills, tinning department and shipping department, and it is expected that the new machinery will be placed in operation next week.

The Russian-American Trading Co. has been organized under the laws of West Virginia, with a capital of $5,000 000 for the purpose of opening stores and warehouses in St. Petersburg, Moscow, Warsaw, Vladivostock and other important points in Russia, to represent American manufacturers of machinery. We understand that the company is negotiating to represent certain manufacturers of railroad supplies. In addition to dealing in these products, the company will build electric street car lines, power and lighting plants and operate steamship lines between New York and the Baltic Sea ports and the Pacific Coast and Siberia. The New York office will be in the Cotton Exchange Bank Building.

The Texas Tie & Lumber Preserving Co., of which Edward E. Ayer, of Chicago, is at the head, has enlarged its plant at Somerville, Tex., by the addition of two new retorts, increasing its capacity from 3,000 ties daily to 4,500.

Haskins, Williams & Co., 1916 Morris avenue, Birmingham, Ala., are in the market for a 7 to 10-ton standard gage switching locomotive; also a 24 to 35-ton standard-gage switching locomotive, saddle-tank preferred.

The Chattanooga & Lookout Mountain Railroad is in the market for one second-hand standard-gage (mogul preferred) locomotive from 35 to 45 tons, about 16 × 24-in. cylinders with pony trucks, not over 48-in. drivers, and equipped with vacuum brake and double sand boxes. Steepest grade on road is 4½ per cent.

New Stations and Shops.

The freight station of the Georgia Midland (Southern) Railroad, at Columbus, Ga., which was destroyed by fire last September, will be rebuilt on the site of the old one. The contract for the work has been let to Butts & Cooper, of Columbus, Ga.

A permit has been issued by the Commissioner of Public Works, Chicago, to the Union Loop Co., to build a new passenger station at Van Buren street and Fifth avenue.

Interlocking.

The Standard Railroad Signal Co., of Arlington, N. J., has contracted to put in an interlocking plant for the Erie Railroad at Great Notch on the Greenwood Lake Division. The machine will have 28 working levers and four spare spaces.

The 840-ft. Steel Arch at Niagara.

All the false work on the new steel arch at Niagara Falls is now in position and the erection of the steel will begin and be continued throughout the winter so that the bridge may be open for traffic early next summer. The arch, together with the abutments, was fully described and illustrated in the *Railroad Gazette* of Feb. 28, 1896. This is much the longest arch span in the world, being 840 ft., and the total metal in the bridge will be about 4,000,000 lbs. The work will be done by the Pencoyd Bridge Company. Mr. L. L. Buck is the Chief Engineer. When the present suspension bridge is taken down it is to be rebuilt on the site of the old suspension bridge at Lewiston, which was destroyed by a wind storm on April 16, 1864.

THE SCRAP HEAP.

Notes.

The Supreme Court of North Carolina has decided that the removal of the State Railroad Commissioners by Governor Russell was legal.

The car house of the West End Street Railway at Everett, Mass., was destroyed by fire on Dec. 24, together with 90 electric street cars. Loss about $150,000.

The Canadian Pacific, which now uses the tonnage rating plan for making up freight trains on the Ontario and Quebec divisions, will, on Jan. 1, adopt it throughout the whole of its lines.

The Erie Railroad has discovered counterfeits of its New York state 1,000-mile ticket, the issue of which was discontinued four months since. It is believed that a large number of the counterfeit tickets have been made.

The Atchison, Topeka & Santa Fe has notified its connections that it will hereafter decline to haul cars in passenger trains unless they are equipped with Westinghouse quick-acting automatic air-brake and the Miller coupler, or a combination coupler which will interchange with it, and not require the use of a link and pin.

The Legislature of Illinois is now in session, and a bill has been introduced providing for taxing express companies and making the rates of transportation by express subject to the orders of the State Railroad Commission. In Virginia there is a bill before the Legislature, introduced by Senator Withers, to create a railroad commission.

The Young Men's Christian Association at Albany, N. Y., will soon have a new home, a building 40 ft. × 140 ft. and four stories high being now nearly finished, on a lot between Broadway and the Union depot yard. The building will cost, exclusive of the lot, about $30,000. Mr. Cornelius Vanderbilt gave $5,000, and public-spirited citizens of Albany made large contributions.

A sensational newspaper has lately repeated the periodical story that railroad companies combine with publishers to "pad" the mails during the period when the bags are weighed by the government; but it appears from answers to inquiries made by conservative newspapers that there is no ground for suspicion at the present time that anything of the kind is going on.

A press dispatch from Ludington, Mich., states that the Flint & Pere Marquette Railway has agreed with the "Federation of Labor" in that city that hereafter all laborers hired in the freight house at that place shall be members of the federation. About a year ago the traffic of the road, which has to be transferred at this point to and from the steamers which run across Lake Michigan, was seriously interrupted by a strike of the freight-house men.

A pneumatic tube for the transmission of mail matter has just been opened between the post office in Boston and the Northern Union station. The postmaster at Chicago tells the newspapers that pneumatic tubes from the Central post office in that city to the railroad stations and to a number of branch post offices will be laid in the near future. Mr. Millholland, President of the New York Tubular Dispatch Co., operating tubes in New York, and Manager of the Batcheller Pneumatic Tube Co., which proposes to lay tubes in Chicago, states that in New York his company is to receive from the government $145,000 a year. The percentage of receipts paid to the city of New York annually is to be two; though for the first year it is only one, and for the second year 1½.

Safety Appliance Laws, Federal and State.

On Dec. 24 the Interstate Commerce Commission issued its formal order postponing for two years the time for compliance with the act of March 2, 1893, requiring the equipment of cars and engines with safety couplers and power brakes. The railroads are reminded that their amenability to this law is in no wise dependent upon their being subject to the act to regulate commerce; the safety appliance law applies to any common carrier engaged in interstate commerce by railroad. The extension of time is uniform to all petitioners, and nothing is said about the status of railroads which did not petition the commission. Concerning the length of the extension—two years—the circular says:

"This will, of course, make it more difficult for some than for others to get ready their equipment within that time, but there is no hardship in this, for the reason that the former has not done all they might have done in the past, and, as before indicated, it is difficult to see how extension of the period can be made in some cases and not in others, or for one period in some cases and a different period in others without practically punishing those which have been the most diligent and putting a premium on the delinquency of those which have been most tardy."

The order says, further, "It is not to be understood by anything in the order herein made that the commission undertakes to relieve carriers of their duty under Section 1 to so arrange and place cars equipped with train brakes that the speed of the train will be controlled by use of that appliance whenever possible."

The order requires roads which have not fully equipped their cars to report every six months to the Commission, giving a statement of the number of freight cars and locomotives which have been equipped.

The State Railroad Commissioners of Massachusetts and of New York have extended the time of the safety appliance laws of those states two years, to correspond with the action of the Interstate Commerce Commission. The New York Commissioners may ask to have the law of that state amended so as not to require the equipment of all cars with air-brakes, the safety of trains being generally sufficiently secured by the use of brakes on one half or two-thirds of the cars in a train.

The Muir Tunnel.

The trains of the Northern Pacific are now running through the Muir Tunnel west of Livingstone, Mont., that was burned out two years ago. The tunnel has been lined throughout with an arch of brick.

Destruction of the Chicago Coliseum.

Early in the evening of Dec. 24 the Coliseum at Chicago took fire and within a few minutes was totally destroyed. This building was planned after the World's Fair for the purpose of conventions, spectacular shows, indoor ball games, etc., and was designed to seat

16,000 people, and covered about five acres. During erection the building collapsed, and a description of that accident will be found in the *Railroad Gazette* of Aug. 30, 1895, page 579. The building was rebuilt and has been constantly in use since its completion. At the time of the fire last week a midwintor fair and carnival was being held, but fortunately the fire broke out at an hour when but few people were in the building. One body has been found in the ruins so far and a careful search was being made for others at last accounts. It is stated that after the football game on Thanksgiving Day it took 18 minutes for the audience to get out of the building and that in 15 minutes after the fire started the building was a total wreck, which goes to show that a fire when the building was filled with people would have caused great loss of life.

During the week ending with Dec. 25 the fire losses in Chicago were unusually heavy, there being 95 alarms during three days of the week. During the fire at the Tosetti restaurant 22 engines were at work, and an average of 8 engines were kept at work for 24 hours.

Hours of Rest for Trainmen.

General Superintendent Spencer, of the Eastern Division of the Canadian Pacific, has issued a circular (No. 319) to the effect that, to insure trainmen and enginemen taking sufficient rest at divisional points, they will in future be required, on arrival at a terminal with a train, to register the following particulars: 1. Date and hour came on duty; 2. Number of hours' rest before coming on duty; 3. Date and hour of arrival; 4. Number of hours on duty without rest; 5. Ready for 12 hours on duty again at; 6. Signature. Enginemen and trainmen must not start out from the divisional point to which they belong unless they are perfectly fresh and fit to make the round trip without rest, if necessary. In no case must they leave *any* divisional point unless prepared for at least 12 hours' service.

Thesis Work at the Massachusetts Institute.

An important part of the work of the senior year at the Institute is that comprised under the term "Thesis." The student is given a problem, such as he might expect in his future professional career, and is supposed to work it out in an independent manner. This work is at once an application and a test of the knowledge acquired in study. One such thesis now being conducted by two students in the Course in Naval Architecture is the determination of the resistance of a ship by means of a small model. Though the total power necessary to drive a vessel at a certain speed is easily obtained, it is quite another matter to ascertain how much of this total is actually used in driving the ship. This latter, or effective part, can be determined either by towing the vessel herself or by towing a model of the vessel, the latter being, of course, far the easier and cheaper way, and quite accurate enough for practical purposes. The experiments mentioned are being carried on on the Charles River near Waltham, the model being that of the U. S. S. Yorktown (about 10 ft. in length). The model is towed ahead of a small steam launch by means of a long spar, its resistance or the pull on its tow line being accurately measured by a spring dynamometer. A straight course of about one-quarter of a mile has been laid out, and marked by stakes at short intervals.

LOCOMOTIVE BUILDING.

The Georgia Pine Railway Co., of Georgia, will buy one new passenger locomotive in the spring.

The Canadian Pacific will build 25 new locomotives during the next year, probably at its own shops.

The Baldwin Locomotive Works are building one locomotive for the Cincinnati, New Orleans & Texas Pacific.

The Chicago, Burlington & Quincy has placed an order with the Pittsburgh Locomotive Works for 20 locomotives.

The International & Great Northern is asking bids on six 10-wheel freight engines. They will have 19 × 24 in. cylinders and 56 in. drivers, and weigh 126,000 lbs.

The St. Joseph & Grand Island has placed the order for the three passenger locomotives referred to in our issue of Nov. 26, with the Rogers Locomotive Works, Paterson, N. J.

The Dickson Locomotive Works, of Scranton, Pa., have received an order for two six-wheel connected saddle tank locomotives, with 10 × 16-in. cylinders, from the Delaware & Hudson Canal Co.

The Baldwin Locomotive Works have received an order from the Norfolk & Western for five heavy compound freight looomotives, to have 23 × 35 × 32 in. cylinders and weigh about 175,000 lbs.

The Terminal Railroad Association of St. Louis has placed an order with the Baldwin Locomotive Works for two new six-wheel switching engines. They will have 19 × 24 in. cylinders, 11 ft. 6 in. driving wheel base and weigh 106,000 lbs.

The Baldwin Locomotive Works are building two consolidation locomotives for the Hokkaido Coal Mining & Railway Co., of Japan. They will have cylinders 16 × 20 in., driving wheels 42 in. in diameter and weigh in working order about 80,000 lbs., with 70,090 lbs. in the drivers. The tenders will have six wheels and a capacity for 2,000 gals. of water.

CAR BUILDING.

The Beech Creek Railroad is reported in the market for a number of new cars.

The Kaslo & Slocan Railroad is having nine cars built by the St. Charles Car Co.

The Kansas Midland expects to buy one combination car and some passenger coaches.

The Indiana Car & Foundry Co. is building 50 flat cars for the Commerce Despatch Line.

The Chicago Great Western is about to place an order for three passenger and six baggage cars.

The Mather Stock Car Co. has placed an order with the Indiana Car & Foundry Co. for 100 stock cars.

The Georgia Pine Railway Co., of Georgia, will probably buy some cab and box cars early next spring.

The St. Charles Car Co. is building 100 freight cars for the Mississippi River & Bonne Terre Railroad.

The Pittsburgh, Bessemer & Lake Erie has placed an order for 100 freight cars with the Ohio Falls Car Mfg. Co.

The Fonda, Johnstown & Gloversville Railroad will be in the market in the spring for two new passenger cars.

The Missouri Car & Foundry Co. is building 119 box cars for the Vandalia Line instead of 100, as stated in our issue of Dec. 17.

President Calloway, of the New York, Chicago & St. Louis, denies the report that the Nickel Plate is in the market for 1,000 cars.

The Canadian Pacific will add 1,000 new freight cars to its equipment during 1898. These will probably all be built at the shops of the road.

The Michigan-Peninsular Car Co. is building 750 freight cars for the Michigan Central Railroad. These are in addition to the 250 referred to Nov. 26.

The Newport News Ship Building & Dry Dock Co. has placed an order with the Ensign Mfg. Co., for two cars of 100 gross tons capacity, for use in the yards of the company.

The Indiana Car & Foundry Co. is not building 100 new cars for the Alton Terminal Railroad, as reported, but is equipping that number with air-brakes and automatic couplers.

The Cincinnati, Hamilton & Dayton has placed orders with the Barney & Smith Car Co., of Dayton, O., and the Michigan-Peninsular Car Co., of Detroit, Mich., for 500 box cars each.

Armour & Co. have placed an order with the Wells & French Co., of Chicago, for 10,000 refrigerator fruit cars. This is the largest refrigerator car order ever placed. Simplex bolsters are specified.

The 50 coal cars which the Mt. Vernon Car Mfg. Co. is building for the Jacksonville & St. Louis, as noted in our issue of Dec. 10, are to be equipped with Westinghouse air-brakes, Gould couplers and Mt. Vernon wheels.

The Pullman Palace Car Co. has so many orders for cars now on its books that but very few more can be taken for delivery before September, 1898, and absolutely no orders can be taken which require delivery before May of next year.

The three passenger cars for the North Pacific Coast Railroad, referred to in our issue of Dec. 17, will be narrow gage and equipped with Westinghouse air-brakes, Miller couplers and wooden brakebeams, and have mahogany interior finish.

The Chicago & Northwestern has placed an order with the Terre Haute Car & Mfg. Co., Terre Haute, Ind., for 500 gondola cars of 60,000 lbs. capacity and 36 ft. long over all, and for 150 furniture cars 50 ft. long, for delivery next April. Chicago couplers and Westinghouse air-brakes are specified.

The Norfolk & Western is asking bids on 500 gondola cars. They will be of 60,000 lbs capacity, 36 ft. 1 in long, with drop ends, Norfolk & Western standard trucks, Westinghouse air-brakes, Sterlingworth brakebeams and M. C. B. standard journal boxes. These cars will be used in Western coal trade.

The Cleveland, Cincinnati, Chicago & St. Louis is preparing specifications for some furniture cars, but it has not yet been decided how many will be built. This road is also repainting and varnishing its passenger equipment at the rate of 40 cars a month, and it is estimated that by May 1 all these cars will be in excellent condition.

In our issue of Dec. 10, we referred to the Chicago, Milwaukee & St. Paul as being in the market for 1,500 freight cars. We now learn that about 500 will be ordered. Some are being built at the West Milwaukee shops and when these are finished others will be built, but the number has not yet been settled. There will probably be not less than 1,000.

The 250 box cars now being built by the Michigan Peninsular Car Co. for the Detroit, Grand Rapids & Western Railroad (referred to in our last iseue), will be of 60,000 lbs. capacity, 38 ft. long and be equipped with Gould couplers, Butler draft gear attachments, Detroit springs, Fox trucks, Fulton Engine & Iron Works bearings, Chicago roofs, Sherwin-Williams paint, National hollow brakebeams, Westinghouse air-brakes and McCord journal boxes and lids.

The Pikesville, Reistertown & Emory Grove Electric Railroad, of Baltimore, Md., is asking bids on 20 new open cars.

The Poughkeepsie City & Wappingers Falls Electric Railway Co., of Poughkeepsie, N. Y., will shortly be in the market for three new open and three new closed cars.

BRIDGE BUILDING.

Austin, Tex.—The Vinning & Coleman Railroad, which is being built by the Vinning Coal Company, of Austin, will require the erection of a bridge 200 ft. long, which will probably be of timber.

Bethany, Mo.—Bids will be received Jan. 6 for constructing a 40-ft. steel span and two approaches, 10 ft. and 14 ft. C. F. Snyder, Commissioner.

Boonville, Mo.—The reports say that a stock company is being formed to build a bridge across the Missouri River at this point, probable cost to be $250,000.

Bozeman, Mont.—A bridge will be built over the West Gallatin River. Bids will be received until Jan. 4.

Camden, Ont.—The old wooden bridge at Dawn Mills will be replaced by a steel structure at a cost of $6,000.

Carthage, O.—It is reported that a petition will be presented to the County Commissioners for the rebuilding of a bridge across Mill Creek between Carthage and Wyoming.

Chicago, Ill.—Considerable interest has recently been shown in the proposed new bridges for the Sanitary District, Chicago, the most important and interesting structure being the eight-track bridge on Section O, where the drainage canal is crossed by the tracks of the Pittsburgh, Cincinnati, Chicago & St. Louis, the Chicago & Northern Pacific and the Union Stock Yards & Transit Co. In our issue of July 2, pages 473, 478, some of the principal features of this large bridge were mentioned, and in our issue of Dec. 3, page 843, several swing bridges, for which contracts have been let, were illustrated.

On December 22 bids were opened by the Board of Trustees for the substructure and superstructure of the eight-track bridge, near Campbell avenue, on Section O, and also for the superstructures of two double-track swing bridges where the Canal is crossed by the Atchison, Topeka & Santa Fe; one on Section N, near Twenty-sixth street, and one on Section G, near Summit.

For the eight-track bridge, in addition to the design made by the engineers of the Sanitary District, three competitive designs were submitted. For the two two smaller bridges mentioned all bids were based on the designs of the Sanitary District, which in all cases provided for swing bridges.

The following table gives a list of the bids for the superstructure of the eight-track swing bridge on Section O, based on the Sanitary District design. The King Bridge Co., of Cleveland, O., was the lowest bidder at $225,000.

King Bridge Co.	$225,000
Edge Moor Bridge Co.	230,000
Elmira Bridge Co.	244,500
The Carnegie Steel Co.	249 559
The American Bridge Works	260,700
The Pennsylvania Steel Co.	261,408
The New Jersey Steel & Iron Co.	262,424
The J. G. Wagner Co., Milwaukee	262,800
Detroit Bridge & Iron Co.	263,784

The bids for the substructure of the eight-track swing bridge were not made in the form of total amounts, but unit prices were submitted on the various materials in place. The following is a list of the bidders: A. J. Tullock; Chicago Star Construction & Dredging Co.; Jonathan Clark & Sons Co., Chicago; Hayes Brothers, Janesville, Wis.; Shailer & Schniglau Co., Chicago; C. L. Stroble, Chicago; McArthur Brothers Co. and Winston & Co., Chicago; J. S. Patterson Construction Co. and Nausler & Lutz, Chicago; The Griffiths and McDermott Construction Co., Chicago; Benezette Williams, Chicago; Lydon & Drew Co., Chicago.

The lowest bid for the substructure was that of the Lydon & Drew Co, Chicago, amounting to $92,450.69, the next lowest bid being about $6,000 in excess of the one named.

The Scherzer Rolling Lift Bridge Co., Chicago, submitted designs for rolling lift bridges to carry eight tracks, a separate bridge being provided for each pair of tracks, so arranged that they may be operated independently or together. This company made three propositions, as follows: For an arch rolling lift bridge of 200 ft. span:

Superstructure, including all operating machinery	$340,000
Superstructure, exclusive of portions of the operating machinery	235,000
Superstructure, exclusive of all operating machinery.	188,000
Substructure for same	145,000

For a cantilever rolling lift bridge of 200 ft. span:

Superstructure, including all operating machinery	$340,000
Superstructure, exclusive of portions of the operating machinery	300,000
Substructure for same	171,000

The third proposition was to build a cantilever rolling lift bridge of 170 ft. span, a greater opening than any bridge on the Chicago River, for $75,000 less than the similar bridge of 200 ft. span. In case the contract is awarded to the Scherzer Rolling Lift Bridge Co., the superstructure will be built by the Pencoyd Iron Co., of Philadelphia, and McArthur Bros. Co., Chicago, will build the substructure.

The Edge Moor Iron Co., Wilmington, Del., entered the following bid on a competitive design of an eight-track bridge, made by Mr. Onward Bates, Engineer of Bridges for the Chicago, Milwaukee & St. Paul:

Superstructure complete with operating machinery	$259,000
Superstructure exclusive of operating machinery	184,000

The bid for the substructure was given by unit prices on the various materials in place.

Mr. C. L. Stroble, Engineer and Contractor, Chicago, entered the following bid on his design for an eight-track bridge:

Superstructure and substructure complete, exclusive of operating machinery	$254,500
Cost of operating machinery, excluding electric motors and brakes	93,000

The following lists give the bids received for the superstructure of the Atchison, Topeka & Santa Fe swing bridge, based on the designs of the Sanitary District, the Carnegie Steel Co. being the lowest bidder in each case:

Double-track swing bridge, Section N., near Twenty-sixth Street.

The Carnegie Steel Co.	$44,242
The King Bridge Co.	46,000
Wisconsin Bridge & Iron Co.	46,719
A. J Tullock, Leavenworth, Kas.	47,000
Elmira Bridge Co.	48,400
American Bridge Works	48,400
Edge Moor Bridge Co.	49,000
Detroit Bridge & Iron Co.	49,346
The J. G. Wagner Co.	49,400
The Pennsylvania Steel Co	50,485
The Toledo Bridge Co.	55,650

Double-track swing bridge, section G., near Summit:

The Carnegie Steel Co.	$51,040
A. J. Tullock	52,986
The King Bridge Co.	53 500
Detroit Bridge & Iron Co.	54,900
The J. G. Wagner Co	55,850
American Bridge Works	56,400
Edge Moor Bridge Co.	56,500
The Pennsylvania Steel Co.	56,663
Elmira Bridge Co.	56,700
Wisconsin Bridge Iron & Co.	56,795
The Toledo Bridge Co.	64,400

The bids, after being opened in public, were referred to the Committee on Engineering of the Sanitary District to be tabulated. After the holidays this committee will hold a conference with the representatives of the various railroad companies concerned, and the contracts will not be let until after this meeting.

Bids opened by U. S. Engineer at Chicago, Dec. 20, 1897, for 5 spans 99 ft. 6 in. × 12 ft. roadway:

King Bridge Co., Cleveland, O.			$13,000
H. Pitt Bridge Co., Pittsburgh, Pa.			12,440
Penn Bridge Co., Beaver Falls, Pa.			10,225
Pittsburgh Bridge Co., Pittsburgh, Pa.			9,750
Toledo Bridge Co., Toledo, O.			8,200
Joliet " " Joliet, Ill.			7,725
A. J. Tullock, Leavenworth, Ky.			7,350
Youngstown Bridge Co., Youngstown, O.			6,850
Stupp Bros. " " St. Louis, Mo.			6,740
J. G. Wagner			6,650
Lafayette Bridge Co.	"	A.	6 465
	"	B.	10,745
Massillon "	"	A.	6,350
" "	"	B.	6,500
Kenwood "	"		6,305
Wisconsin "	"	A.	5,805
" "	"	B.	6,005

Clay Court House, W. Va.—The county court of Clay County, W. Va., has contracted with the Vulcan Bridge & Road Machine Co., of Charlestown, W. Va., for the erection of a highway bridge over Elk River, near Clay City, in Clay County. The contract price is $10,900, and the bridge is to be completed by Feb. 1, 1898.

Clinton, Ind.—An election will be held Feb. 3 to vote on the proposition to appropriate $12,000 toward the construction of a bridge over the Wabash River at Clinton.

Duluth, Minn.—It is reported that the Board of Public Works will replace the bridge over the west branch of Lester River at Graves avenue with a new structure.

Fair Haven, Md.—Bids are wanted Jan. 4 for building an iron bridge, 60 ft. span, near Fair Haven, in the eighth election district, Anne Arundel County. A. H. Stallings is clerk of the Board of Commissioners.

Forest City, Pa.—The Carbondale Traction Co. will build a bridge over one of the creeks in this town.

Greenwood, Miss.—The Supervisors (Leflore County) will let contract at their January meeting for a new iron bridge. G. E. Williamson, Clerk.

Indianapolis, Ind.—There is a movement on foot to have a new iron bridge built at Washington street in place of the present one, which is narrow and inadequate.

Laceyville, Pa.—A new bridge is talked of for this place to cost about $25,000. Thomas Haines can probably give information.

Montpelier, Vt.—The city has appropriated $1,400 for a suspension bridge 8 ft. wide.

Morgantown, W. Va.—The City Council has purchased sites for the landings and abutments for a new highway bridge over Decker's Creek, and has closed all preliminary arrangements. The County Court, which has the letting of the contract and superintendence of building the bridge, refuses to let the contract before March 15, or to allow the old bridge to be disturbed before April 1, fearing bad weather may set in after work has been commenced, thus closing the road an unreasonable time.

New York; N. Y.—The contract for building the Riverside viaduct, from the present terminus of the Riverside Drive to 135th street, was awarded Dec. 28 to O'Brien, Sheehan & McBean, New York. Their bid amounted to $570,019. The work must be completed in 400 days.

Saginaw, Mich.—It is reported that City Engineer H. E. Terry is preparing plans for a new bridge at Court street.

Sioux City, Iowa.—The Board of Aldermen are considering the question of a new bridge across Floyd River—which it is estimated would cost about $10,000.

Spokane, Wash.—It is reported that the Great Northern will replace all its wooden bridges in this locality by steel and stone structures.

Toledo, O.—A new lift bridge will be built at Lafayette street. Willard F. Brown, City Engineer.

Toronto, Ont.—The Ontario government estimates for 1898 include the following: Bridge piers for bridge over Winnipeg River $2,700; Indian Head bridge over Lake Wolsey, $1,500; Keewatin bridge for superstructure, $2,140; to renew Joseph River bridge, $1,000; Head River bridge, $1,250, and to build Wabis Creek bridge, Liskeard, $1,000.

Troy, N. Y.—Taxpayers of the Sixth Ward are agitating the question of a new bridge from the town section of the city to Watervliet.

Ventura, Cal.—The Board of Supervisors have asked for bids for building a bridge across the Santa Clara River to contain 2,800 ft. of earth levee, 600 ft. of timber trestle and 12 short spans of steel and wood. George C. Power, City Engineer.

Victoria, Texas.—It is reported that the Guadalupe Valley Construction Co. has been organized with a capital stock of $400,000 for constructing bridges for the proposed Guadalupe Valley Railway Co. Incorporators: John P. Nelson, J. A. McFadden, T. M. O'Connor, J. J. Welder, Thos. Buhler, J. M. Brownson, T. D. Wood, all of Victoria.

Washington, D. C.—Capt. D. D. Gaillard, Corps of Engineers, U. S. A., has prepared designs and estimates which have been submitted to Congress for both a stone arch and a steel bridge with stone foundations over Rock Creek on the line of Massachusetts avenue. The estimated cost of the stone arch bridge is $568,545, and for the steel bridge $199,204.

RAILROAD LAW—RECENT DECISIONS.

In New York a religious corporation is held to be entitled to recover compensation for injury arising out of the fact that the noise caused by the operation of an elevated railroad in front of the premises has seriously interrupted and interfered with the religious services conducted in its church (decided by the Appellate Division October, 1897).[1]

The New York statute permitting the owner of a lost promissory note or bill of exchange to recover the amount due thereon upon furnishing a bond with two sureties, indemnifying the obligor against any claim by any other person on account of the note or bill, is held to apply to lost coupons of railroad bonds secured by mortgage, where the bond and mortgage both provide for the payment of interest on the bond upon presentation and delivery of the coupon (decided by the Supreme Court October, 1897).[2]

In New York the Court of Appeals has decided (reversing the decision of the Appellate Division in an action for damages for the death of a freight brakeman, alleged to have been caused from striking a bridge, by reason of the failure of his employer, a railroad company, to provide the warning signals required by statute), that evidence showing that the deceased was standing on the top of a car just before the train passed under the bridge and that immediately thereafter he was found lying on the top of the car in a dying condition, was not sufficient to establish the essential fact that his death was caused by contact with the bridge (decided by the Appellate Division of the Supreme Court, November, 1897).[3] The court intimates in its opinion in this case that additional evidence tending to show that the brakeman died from violence and not from disease, or even proof of an earnest effort to obtain such evidence, would have been sufficient to support the verdict in favor of his representative.

In Massachusetts, on the trial of an action against a railroad company to recover damages for loss of baggage by theft, it appeared that the porter of a sleeping car, half an hour before starting time, after putting a passenger's valise in a seat of the car, opened the window next to the seat, in violation of a rule of the company. The passenger was about to sit in the seat when the window was opened, and the porter had no reason to believe that he would leave it, but he did so, while his wife remained in the car walking up and down the aisle, and the baggage was stolen. The court holds that, under these circumstances, the questions whether the company was guilty of such negligence as would support, or the passenger of such negligence as would bar a recovery, were properly left to the jury for decision (decided by the Supreme Court, October, 1897).[4] Although where baggage remains in the custody of a passenger, the railroad company is not bound to insure its safety, as is the rule when merchandise is intrusted to it as a common carrier, it must as a matter of law so manage its car as not unreasonably to expose the property to an unusual risk of loss by thieves or otherwise.

In the same State, in an action for damages against a railroad company for failure to deliver goods with reasonable dispatch, the defendant is declared to be liable only for such damages as naturally result from its conduct, and which might have been expected to be within the contemplation of the parties as the probable result of a breach of the contract of carriage. Accordingly, where the delivery of certain boilers for the plaintiff's mill was delayed through the negligence of the company, the plaintiff was not entitled to compensation for time during which its business was suspended, nor for money paid mechanics employed to set up the boilers, while awaiting their arrival, in the absence of evidence that at the time of making the contract it had notice of such circumstances, either express or fairly to be inferred (decided by the Supreme Court, October, 1897).[5]

An Ohio statute gives to any sheriff of any county of that State the right to ride on freight trains "in the performance of his official duties and to take a prisoner or prisoners upon said train between stations where such trains stop" at his own risk, upon tender of the regular passenger fare. In an action brought by a sheriff to recover damages for expulsion from a freight train, this statute is construed to apply whenever such a train in fact stops at any station. It is not necessary that the train should regularly stop at such station, or be scheduled to stop there. It is further held that the the right under the statute is not confined to cases in which a prisoner is taken upon the train but exists whenever the sheriff is in the performance of any official duty and complies with the statute in other respects (decided by the Supreme Court, October, 1897).[6] This statute confers the same privilege on physicians in the discharge of professional business.

In Indiana it is held not to be actionable negligence per se, for a railroad company to have the doors of vestibule cars on its trains closed and locked. In the case decided, it appeared that one of the defendant's passenger trains having five coaches arrived at a station, that the two front coaches, which had room for all passengers at the station, stood directly in front of the platform, that their doors were open, that the coach next to the rear one was equipped with vestibules and stood 60 ft. from the platform, that the doors to it and to the rear car were locked, that these cars were not intended for the use of passengers at this station, that the lights in all the coaches were lit, that the plaintiff got on the front end of the vestibule car at about the time the train started, that he did not then know that the door was locked or that any car was not intended for the use of passengers, and that he attempted to climb around from the steps of the vestibule car to the car in front of it while the train was moving and fell and was injured. Under these circumstance a verdict in his favor is reversed on appeal without regard for any consideration of negligence on his part, (decided by the Appellate Court, November, 1897).[7]

In Kansas a shipper of stock over a railroad line in consideration for a reduced freight rate made a contract whereby he released the railroad company from all liability from any injury to the stock not resulting from the willful negligence of the road's servants or agents. This contract is declared to be contrary to public policy, and therefore void (decided by the Court of Appeals, October, 1897).[8]

[1] Church of H. P. vs. Manhattan et al. 21 App. Div. 47.
[2] Rolston et al vs. Central Park N. & E. R. 21 Misc., 439.
[3] Fitzgerald vs. N. Y. C. & H. R. R. R. Co. 154 N. Y., 263.
[4] Dawley vs. Wagner Co., 47 N. E., 1024.
[5] Swift River Co. vs Fitchburg, 47 N. E., 1015.
[6] Allen vs. Lake Shore, 47 N. E., 1037.
[7] C., C., C. & St. L. vs. Wade, 48 N. E., 12.
[8] St. L. & S. F. vs. Tribbey, 50 Pac., 458.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Canada Southern, semi-annual, 1 per cent., payable Feb. 1.

Lake Shore & Michigan Southern, semi-annual, 3 per cent., payable Feb. 1.

Michigan Central, semi-annual, 2 per cent., payable Feb. 1.

Norfolk & Southern, quarterly, 1 per cent., payable Jan. 10.

Rio Grande Western, preferred, quarterly, ¾ per cent., payable Feb. 1; extra 1 per cent., payable Feb. 15.

Rutland Railroad, semi-annual, preferred, 1 per cent., payable Jan. 3.

Texas Central, preferred, 3 per cent., payable Jan. 15.

Worcester, Nashua & Rochester, semi-annual, 2½ per cent., payable Jan. 1.

National Railway (St. Louis), 1½ per cent., payable Jan. 10.

Stockholders' Meetings.

Meetings of the stockholders of railway companies will be held as follows:

Worcester, Nashua & Rochester, annual, Worcester, Mass., Jan. 11.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Civil Engineers* meets at the House of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds its formal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Chicago Electrical Association* meets at Room 7137 Monadnock Building, Chicago, on the first and third Fridays of each month, at 8 p. m. J. R. Cravath, Secretary.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Denver Society of Civil Engineers* meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Engineers' Club of Columbus*, (*O.*), meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Locomotive Foreman's Club* meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *New England Railroad Club* meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

The *New York Railroad Club* meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *North-West Railway Club* meets on the first Tuesday after the second Monday in each month, at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *St. Louis Railway Club* holds its regular meeting on the second Friday of each month, at 3 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736-1739 Monadnock Block, Chicago

American Society of Civil Engineers.

In the December Proceedings of the American Society of Civil Engineers notice is given that hereafter the house of the society is to be open every day in the year, including holidays, from 9 o'clock in the morning until 10 o'clock in the evening, except Sundays, when it is open from 2 p. m. until 7 p. m.

National Board of Trade.

The resolutions passed by the National Board of Trade at its annual meeting at Washington, Dec. 15, were as follows, being adopted by a two-thirds vote:

Resolved, That the National Board of Trade earnestly advocates legislation by Congress to amend the Interstate Commerce Law so as to permit pooling by railroads under the supervision and control of the Inter-State Commerce Commission, to the end that unjust discriminations may be prevented and reasonable, uniform and stable rates be established.

That as a step toward justice in transportation rates, greater uniformity in the classification of freight is necessary; and should the railroad companies fail to formulate and put into effect a uniform classification of freight within a reasonable time, that the Interstate Commerce Commission should be empowered to formulate and make effective such a classification.

That the National Board of Trade deprecates all movements looking to the government ownership of railway lines; but advocates a wise, firm and continuous supervision over the operation and management of these great agencies in all matters affecting their relations with the public in the conduct of interstate commerce;

That the National Board of Trade reaffirms its approval of the bill known as the Anti-Scalper bill, now pending in Congress, designed to protect both travelers and carriers against fraudulent and irregular practices in passenger traffic

And Whereas, The decisions of the United States Supreme Court have so weakened the power of the Interstate Commerce Commission to perform the duties originally outlined for it,

Therefore, be it Resolved, That we petition Congress to so amend the Interstate Commerce law as to clothe the Commission with power to carry out the original intentions of the act.

Engineers Club of St. Louis.

The annual dinner was held Dec. 15, at the Southern Hotel, at 8:30 p. m. After dinner the meeting was called to order by President Flad. There were 39 members and 6 visitors present.

The President announced that the result of the ballot for officers for 1898 was as follows: *President*, Wm. H. Bryan; *Vice-President*, B. H. Colby; *Secretary*, Richard McCulloch; *Treasurer*, Thomas B McMath; *Librarian*, E. J. Jolley; *Directors*, Edward Flad, John A. Laird; *Members of the Board of Managers of the Association of Engineering Societies*, J. B. Johnson, Arthur Thatcher.

The proposed amendment to the constitution had been carried by a vote of 91 for the amendment and 8 against it.

President Flad then addressed the club, giving a resume of the work of the year. He then introduced the new president, Mr. Wm. H. Bryan, who presided during the remainder of the evening. Mr. Bryan made an address in taking the chair, in which he outlined some of the plans for the next year.

Col. E. D. Meier then responded to the toast "The Engineer Socially Considered." He gave a humorous account of the origin of engineers and engineering and

advised engineers to devote more attention to the social side of life. Mr. M. L. Holman responded to the toast "Wanderings Abroad." He gave an account of a recent trip to Germany, his remarks being replete with humor and wisdom. The toast of "Early Experiences" was responded to by Mr. Henry Branch. The ups and downs of the young engineer were the subject of his remarks. Mr. F. A. Abbot then addressed the club on the subject of "The Engineer as a Contractor." After remarking on the universal suspicion which seems to attach itself to the contractor, he prophesied the approach of a golden age when all contractors would be engineers, and all extra work bills would be paid without question. Informal remarks were made by Prof. J. B. Johnson and Prof. C. M. Woodward.

Western Railway Club.

A regular meeting of the Western Railway Club was held Tuesday, Dec. 21, at the Auditorium Hotel, Chicago. The Secretary read the names of 25 applicants for membership, and also an invitation from the Niles Tool Works for the members of the Club to visit the works of that company at Hamilton, O., on Tuesday, Dec. 28.

President Delano announced that the topic for discussion at the next meeting would be "Rails and Track," and that the subject would be considered under the following heads:

What are the advantages of heavier rails?
What is the most economical weight of rail?
Are the qualities of rails affected by changes in weight?
What are the proper specifications for rails?
What are the proper tests for rails?
What is the safe maximum load per running foot for rails of various weights?

It is expected that the members before the next meeting will prepare themselves for discussing one or more of these sub topics, and also that discussions and data will be furnished by a number of engineers not members of the Club

A paper, "Pooling Locomotives and Locomotive Crews," was presented by Mr. J F. Deems, of the Chicago, Burlington & Quincy Railroad. This paper described briefly the systems for handling locomotives and crews in use previous to the introduction of the pooling system, and the causes which led up to the pooling of engines. Various letters were presented from roads which have had the pooling system in use for a number of years, and from these and Mr. Deems' personal experience the following conclusions are drawn: Under the pooling system the engines make an increased mileage; if anything, the locomotive repairs under this system are reduced and the same work can be done with about 20 per cent. less motive power.

An extended discussion followed the presentation of the paper and a wide difference of opinion prevailed among some of the members as to the merits of the pooling system compared with the systems in use on various Western roads Much of this difference of opinion could be traced directly to an improper understanding of what Mr. Deems considered an engine pool.

A portion of a car axle was shown at the meeting which had been made by piling eight iron bars about a central steel bar forming a composite axle. A discussion of the advisability of using such axles showed that good forged steel axles were much to be preferred to scrap wrought-iron axles as now made, or composite axles.

A short discussion was held as to whether car builders were justified in turning out cars the drawbars of which were more than 34¼ in. above the top of the rail when the cars were empty. The general opinion seemed to be that the drawbars of new cars should not be made above the standard height, but that if such was done the railroads and not the car builders were to blame, as the cars were constructed under rigid specifications furnished by the railroads.

Central Railway Club.

The November meeting of the club was held at the Tower Hotel, Niagara Falls, President John Mackenzie in the chair.

The report of the committee having the subject "Springs for Freight Car Trucks," was postponed, as more time was required to complete drawings, which it was desired to submit. A topical discussion, "Journal Bearing Keys: Their Proper Relation to the Journal Bearing and Box," was also postponed, as Mr. Ball, who had the subject in charge, was absent.

REMOUNTING CAR WHEELS.

Mr. John S Lentz opened the topical discussion on mounting second-hand wheels, as embodied in the question presented by Mr. Higgins, "How are we to use the measurement 4 ft. 6¾ in , as noted on page 10 of the M. C. B Code that went into effect Sept. 1, when mounting second-hand wheels where it is only necessary to remove one wheel, the wheel left on the axle having worn flange, but not worn bad enough to condemn it?"

Mr. Mackenzie explained how the measurement was made, namely, 4 ft. 6¾ in. from the thorat of the flange of one wheel to the inside of the flange of the other. Mr. Macbeth thought the gage was of no use on second-hand wheels, and that it could not be done and still have both wheels true with regard to the center of the axle. In this opinion others concurred. President Mackenzie, further explaining Mr. Higgin's question, said that the point was: If the flange is worn of the wheel that remains on the axle, how much wider spread should you make the wheels than if the flanges were full? Or, in other words, would you instead of making the wheels between the flanges 4 ft. 5¼ in. as the old practice was, make them 4 ft. 5⅝ as the rule now calls for, the 1⅛ in. being worn on the flange that is thinner, requiring the pressing of the wheels out.

Mr. Mackenzie concurred with others that the general practice of mounting second-hand wheels by maintaining the old measurements between the flanges was wrong and a source of danger to guard rails. Mr. McCarthy thought that the principle of the new code was undoubtedly a correct one and that the practice quite general in mounting second-hand wheels to keep the back of the wheel right at all times was a source of error often the cause of derailments, and one of the errors which led to the adoption of the rule

In connection with the discussion Mr. Slocum, by vote of the meeting, read an article from the *Railroad Gazette* of Aug 27, by Mr. Edward Grafstrom, "Wheel Mounting and its Relation to the Gage," which travested upon several points of the discussion

It was the sense of the meeting, and a motion to that effset was carried, that it was unmechanical and not good shop practice to, in mounting second-hand wheels, remove only one wheel from the axle and try to mate it with another; both wheels should be pressed off, and before mounting two wheels should be selected, mating as near as possible.

A motion was put "that the figures of the M. C. B. A. code, of 4 ft. 6¾ in. from the throat of the flange of one wheel to the inside of the flange of the other, is good practice, and should be followed by the members of the Central Railway Club." Mr. Robson said that he thought it would be good practice as far as new wheels are concerned, but for old wheels it was all humbug. The motion was lost.

The following committees were appointed, on acceptance of invitation of President Griffin, of the New York Car Wheel Works, to attend a series of car-wheel tests: A. C. Robson, J. A. Bradley, John Magarvey; annual entertainment, F. B. Griffith, O. P. Litchworth, C. E. Rood, E. A. Benson, H. H. Hewitt; nominations, E. Chamberlain, A. C. Robson, H. C. McCarthy, P. E. Garrison, J. A. Bradley.

The next meeting will be held at the Hotel Iroquois, Buffalo, N. Y., Friday, June 14. There will be an election of officers and the business session will be preceded by a car wheel test at the New York Car Wheel Works. The report and the discussion postponed at the November meeting will be taken up, also the topical question submitted by Mr. J. R. Petrie: "In receiving cars loaded, can they be refused by the receiving company when they are 34⅛ in. from the top of the rail?"

PERSONAL.

—Mr. T. A. Kearns has resigned as Traveling Auditor of the International & Great Northern.

—Mr. E. La Lime, heretofore Superintendent and Master Mechanic of the New York & Ottawa, has resigned.

—Mr. H. S. Reardon, heretofore Superintendent of the Chicago, Peoria & St. Louis, with headquarters at St. Louis, has resigned, to take effect Jan. 1.

—Mr. Don Alexander, Assistant General Freight Agent of the Chesapeake & Ohio, with headquarters at Louisville, Ky., has resigned, to take effect Jan. 1.

—Mr. Benjamin N. Starks, Superintendent of the St. Louis and Henderson Division of the Louisville & Nashville, at Evansville, Ind., has resigned. Effective Jan. 1.

—Mr. Marshall Newell, Assistant Division Superintendent of the Boston & Albany, was killed by a locomotive in the yards at Springfield, Mass., on Christmas Eve.

—Mr. Frank S. Hammond has resigned his office of Assistant General Manager of the Kansas City, Pittsburgh & Gulf, with headquarters at Kansas City, Mo. That office has been abolished.

—Mr. Robert Gillham, General Manager and Chief Engineer of the Kansas City, Pittsburgh & Gulf and controlled lines, has been elected a member of the Institution of Civil Engineers of England.

—Capt. Edmund A. Morse, of Rutland, Vt., died at his home, Dec. 24. He was in charge of the rebuilding and maintenance of railroads in the Gulf Department, by order of General Banks at the close of the Civil War.

—Mr. Powhatan Wooldridge, of St. Louis, Soliciting Freight and Passenger Agent of the International & Great Northern, died at San Antonio, Tex., Dec. 15. He was formerly connected with the Texas & Pacific at Dallas.

—Charles Ewing Green, LL.D., President of the Board of Trustees of Princeton Theological Seminary, died at Princeton, N. J., Dec. 23, at the age of 57. Dr. Green was a director of the United New Jersey Railroad & Canal Co.

—Mr. Thomas Kingston, died in Madison, Wis., Dec. 20. He would have been 101 years old on Jan. 20. He was a contractor of one of the first railroads building to reach Madison, Wis., and lost his fortune in the work, which was abandoned.

—Mr. William Henry McDoel, Vice-President and General Manager of the Chicago, Indianapolis & Louisville, will complete his 33d year in an official capacity on Jan. 1. He entered railroad service in 1860, in a clerical capacity.

—Mr. William H. Peddle, Superintendent of the New Jersey Central Division of the Central of New Jersey, with headquarters at Jersey City, N. J., has resigned. Effective Jan. 1. Mr. Peddle will be connected with the Old Colony Line hereafter.

—Mr. N. S. Pennington, heretofore Traffic Manager of the Florida Central & Peninsula, has resigned on account of ill health; his resignation to take effect Jan. 1. Mr. Pennington was with the road as General Freight Agent before being appointed Traffic Manager in January, 1889.

—Mr. George Francis Hess, who for 47 years was in the employ of the Central of New Jersey, and for 25 years occupied the position of Paymaster with the company until about a year ago when he was retired on a pension, died at his home in Elizabeth, N. J., Dec. 26, of apoplexy. He was born in Easton, Penn., 72 years ago, being the son of Judge George Hess, one of the founders of Lafayette College, and the first Mayor of Easton.

—Mr. Horoce G. Burt, who is to be the President of the Union Pacific, is a railroad man of experience, originally a civil engineer. He has served as Chief Engineer of the Chicago & Northwestern, General Manager of the Fremont, Elkhorn & Missouri Valley and Sioux City & Pacific railroads, and Assistant to the President of the Chicago, St. Paul, Minneapolis & Omaha Railroad. He became Third Vice-President of the Chicago Northwestern about a year ago.

—Mr. Samuel Sloan, President of the Delaware, Lackawanna & Western, was the recipient on Thursday, Dec. 23, of a solid gold tea service made by Tiffany & Co. and valued at $16,000, the gift of the officers and employees of the road in commemoration of Mr. Sloan's 80th birthday, which occurred on Dec. 25. It appears that Mr. Sloan first learned of the intended testimonial from the newspapers and, according to the reporters, he strongly disapproved of the project, saying that subscriptions to such a lavish gift would necessitate fewer or cheaper gifts for the wives and children of the subscribers; but it seems that the number of "employees" contributing was only about 250, from which it would appear that their contributions averaged $64 each. It is pretty safe to conclude, therefore, that the horny-handed section man and the low salaried clerk did not take a very prominent share in the matter. The committee which secured the money and decided upon the character of the gift consisted of H. C. Hicks, General Freight Agent, Chairman; W. F. Holwill, J. B. Marston, A. H. Schwarz, L. B. Foley, A. C. Salisbury, G. E. Zippel, A. H. Storrs, and G. A. Holden, treasurer. The presentation speech was made by Vice-President E. R. Holden.

Mr. Sloan entered railroad service in 1854 with the Hudson River Road, and became President of the Delaware, Lackawanna & Western in August, 1867. He is also President of 10 other roads.

—Dr. Armand J. De Rosset, of Wilmington, N. C., who died on Dec. 9, was probably the oldest railroad director in the country, having been in the board of the Wilmington & Weldon for 55 years. He was born in Wilmington, October 6, 1807. He was the son of Dr. A. J. De Rosset, and there had been a Dr. De Rosset in Wilmington continuously for 156 years.

Dr. De Rosset did not greatly enjoy the practice of medicine; and he abandoned it once, resuming practice later at the solicitation of his neighbors; but he finally abandoned it and went into manufacturing. In 1860, in company with John P. Brown, he established a mercantile house, which became large and prosperous. The troubles following the war made it necessary to wind up the business, and the situation was so bad that the firm could easily have settled for 50 cents on the dollar, but Dr. De Rosset turned over all his private property and paid every cent. In 1849 Dr De Rosset conducted the Wilmington & Weldon through difficult financial straits, going to England to buy rails, when the credit of the road was almost worthless. The Doctor's experiences in England were very disheartening, but he finally succeeded in inducing two firms of railmakers to take bonds for rails, the state of North Carolina having released its mortgage on the road. Again, in 1865, Dr. De Rosset went to England, and was successful in getting an extension of time from English bondholders. He accepted no compensation for either of these missions. Dr. De Rosset was an active and zealous member of the Episcopal Church, and had been Senior Warden for nearly 50 years, as well as Treasurer of the Diocese of East Carolina.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio Southwestern.—The office of Superintendent of Bridges and Buildings has been abolished. H. M. Hall, with headquarters at Washington, D. C., was the Superintendent.

Canadian Pacific.—H. C. Carter has been appointed General Agent for Alaska and the district of the Yukon, with headquarters at Vancouver, B. C.

Central of New Jersey.—George H. Frech, General Train Dispatcher at Roselle, N. J., has been appointed Division Superintendent, with headquarters at Jersey City, succeeding W. H. Peddle, resigned.

Central of Georgia.—S. C. Hoge, heretofore Superintendent of the First Division, with headquarters at Macon, Ga., has been appointed agent at Macon, succeeding H. Yonge, resigned. B. C. Epperson, heretofore Superintendent of the Second Division, has been appointed to succeed Mr. Hoge at Macon. Jesse H. Hall, heretofore Trainmaster of the Southern Division, has been appointed Superintendent of that Division, succeeding Mr. Epperson. Frederick Robinson, City Ticket Agent at Atlanta, Ga., has been appointed Traveling Passenger Agent, with headquarters at Chicago, Ill. W. H. Stulb, heretofore Master Mechanic, with headquarters at Augusta, has been appointed Master Mechanic at Macon, Ga., succeeding John Dempsey, resigned.

Charleston & Western Carolina —Wm. McLeod has resigned as Auditor to accept other service with the company; the accounting departments of this company are consolidated with E. W. Mills in charge as Auditor, with headquarters at Augusta, Ga.; effective Jan. 1.

Chesapeake & Ohio.—The office of Assistant General Freight Agent at Louisville, Ky., will be abolished after Jan. 1.

Chicago, Peoria & St. Louis.—C. Millard, Superintendent of the St. Louis, Chicago & St. Paul, has been appointed Superintendent of the Chicago, Peoria & St. Louis, succeeding H. S. Reardon, in addition to his present duties. The office of General Manager H. W. Gays, of the Chicago, Peoria & St. Louis and the St. Louis, Chicago & St. Paul, will be transferred from Springfield, Ill., to St. Louis, on Jan. 1.

Cleveland, Cincinnati, Chicago & St. Louis.—C. O. Stimson, Division Freight Agent at Lafayette, Ind., whose appointment as Assistant General Freight Agent with the Chesapeake & Ohio was noted in our issue of Dec. 17, has declined the appointment, it having been made to his interest to stay in his precent capacity, with headquarters at Lafayette, Ind.

Columbus, Fulton & Northern.—The stockholders of this company, referred to in another column, met at Columbus, Dec. 16, and elected officers and directors as follows: President, Newman Cayce; Vice-President, J. T. Senter; Secretary, J. Walker; General Counsel, J. W. Buchanan; other Directors, David Johnson, T. B. Franklin, W. B. Walker; W. B. Fitzgerald and Thomas J. O'Neil.

Columbus, Sandusky & Hocking Valley.—T. M. Downing, Master Mechanic at the shops in Delaware, O., has been appointed Superintendent of Motive Power to succeed F. P. Boatman, resigned, at Columbus, O. Effective Dec. 20.

Georgia Southern & Florida —S. M. Brown has been appointed General Agent, with headquarters at Macon, Ga., and the office of Traveling Freight Agent, formerly held by H A. Gibson, with headquarters at Macon, Ga., has been abolished. Change and appointment effective Jan. 1.

Guadalupe Valley.—At the meeting of the stockholders of this company, referred to in another column, held at Victoria, Tex., Dec 20, the following Directors were elected: J. M. Brownson, J. F. Welder, G. A. Levi, J. K. Hexter, J. A. McFadden, J. D. Mitchell.

Intercolonial.—T. E. Dodd, for many years in charge of the Traffic Department of the Grand Trunk, has been appointed Chief Clerk of the Freight Department of the Intercolonial, with headquarters at Moncton, N. B. He will assume his new duties on Jan. 1.

International & Great Northern.—J. S. Dallan has been appointed Traveling Auditor, with headquarters at Palestine, Tex., succeeding T. A. Kearn, resigned.

Kansas City, Pittsburgh & Gulf.—F. Mertsheimer, heretofore Superintendent of Motive Power and Equipment, with headquarters at Kansas City, Mo., has been appointed to the newly created office of General Superintendent, with headquarters at the same place. A. F. Rust has been appointed Engineer of Maintenance of Tracks and Bridges; F. T. Robertson and O. H. Crittenden have been appointed Assistant Engineers.

Louisville & Nashville.—W. S. Martin, heretofore Superintendent of the Main Line Division, with headquarters at Louisville, has been transferred to Evansville, Ind., succeeding B. F. Dickson as Superintendent of the St. Louis and Henderson Division. B. M. Sparks, Assistant Superintendent of the South and North Alabama and Birmingham Mineral Division, with headquarters at Birmingham, has been appointed to succeed

Mr. Martin as Superintendent of the Main Line. He in turn will be succeeded by J. L. Welch, Train Master of the south end of the North and South Divisions, with headquarters at Birmingham. Changes and appointments effective Jan. 1.

Maine Central.—A. A. White has been appointed Division Superintendent in charge of the company's line east of Bangor, with headquarters at Bangor, Me., succeeding Henry F. Dawst, resigned. (See these columns for last week.)

Memphis & Charleston.—C. P. Cooper, heretofore Paymaster, has been appointed Auditor, succeeding A. H. Plant, resigned, with headquarters at Memphis, Tenn. Effective Jan. 1.

Mexican Central.—Harry J. Snyder has been appointed Commercial Agent at New Orleans, La., succeeding J. F. Donahoe. He took charge of his new office Dec. 18. Mr. Snyder was formerly in the General Freight Agent's office in the City of Mexico.

Mobile & Ohio.—Mr. A. W. McIntosh has been appointed Assistant Secretary and Transfer Agent, with headquarters in New York City.

New York & Ottawa.—The duties of Superintendent and Master Mechanic have been assumed by C. B. Hibbard, with headquarters at Moira, N. Y., succeeding E. La Lime, resigned.

Ohio River.—E. La Lime, heretofore Superintendent and Master Mechanic of the New York & Ottawa, has been appointed Master Mechanic of the Ohio River road, with headquarters at Parkersburg, W. Va.

Pennsylvania.—Arthur Hale, Chief Clerk in the office of the General Superintendent of Transportation at Philadelphia, Pa., has been appointed to fill the newly created office of Superintendent of Telegraph; appointment effective Jan. 1. Headquarters at Philadelphia.

Rochester & Irondequoit.—At the annual meeting of the stockholders held at Rochester, N. Y., Dec. 21, Haywood Hawks, William Purcell and Joseph C. Tone were elected directors. At the meeting of the directors held same place and time, Max Brickner was elected President, to succeed J. N. Beckley, who refused re-election; George W. Archer was elected Vice-President and Frederick P. Allen Treasurer, succeeding Frederick Cook.

St. Louis & San Francisco.—G. W. Martin, heretofore General Agent, with headquarters at Denver, Col., has been appointed General Western Agent. Appointment effective Jan. 1.

Southern Railway.—The offices of Mechanical Engineer, General Superintendent, Superintendent of Transportation, General Storekeeper and Fuel Agent have been abolished, and the Chief Engineer will be relieved of the charge of Maintenance of Way. W. H. Green has been appointed Assistant General Manager, to have charge of Real Estate Leases within and adjacent to right-of-way lines, United States Mail Service, and Marine, Surgical, Insurance, Fuel and Dining Car Departments; J. H. Barrett has been appointed General Superintendent of Transportation, in charge of Train and Station Service and the operation of Motive Power and Rolling Equipment. W. H. Peddle has been appointed General Superintendent of Maintenance of Way, with headquarters at Washington, D. C. Appointments and changes effective Dec. 27.

A. L. Langellier, heretofore Agent for the Land and Industrial Department of the Southern in Boston and other sections of the East since March, 1896, has resigned to engage in other business. He will be succeeded by L. Scott Allen, with headquarters at Boston, Mass.

A. H. Plant has been appointed Auditor, with headquarters at Washington, D. C, succeeding G. C. Hobbs. Appointment effective Jan. 1. Mr. Plant was formerly Auditor of the Memphis & Charleston.

Union Pacific.—Horace G. Burt, Third Vice-President of the Chicago & Northwestern, has been selected by the Reorganization Committee for the Presidency of the reorganized Union Pacific, succeeding S. H. H. Clark. The Board of Directors is to include Winslow S. Pierce, Chairman; James Stillman, Marvin Hughitt, President of the Chicago & Northwestern; Roswell Miller, President of the Chicago, Milwaukee & St. Paul; E. H. Harriman, Louis Fitzgerald, Henry B. Hyde, John W. Doane, Otto H. Kahn, T. Jefferson Coolidge, Jr., George J. Gould, Oliver Ames, George Q. Cannon and Jacob H. Schiff. Oliver W. Mink is to be Vice-President in charge of the New York office. Mr. Burt's selection as President is intended to carry into effect the policy determined upon by the Reorganization Committee.

Vining & Coleman.—The officers of this company, referred to in another column, are as follows: President, Will L. Vining; Secretary, E. A. Lindsey; Chief Engineer, W. G. Sweed, all of Austin, Tex.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Charleston, Clendennin & Sutton.—This company, which is now operating a railroad from Charleston, W. Va., east 50.8 miles to Clay Court House, W. Va., along the Elk River Valley, will extend the line northeast 50 miles to Sutton, beginning work as soon as the weather opens in the spring. The company has the road graded 13 miles beyond Clay Court House, and has ties and rails piled up along the right of way ready to be laid. Work on the road was stopped last summer, when the directors learned that a syndicate had bought up 170,000 acres of land bordering both sides of the right of way, a distance of nearly 30 miles, and that this land, known as the Cameron tract, was to be held for speculation and would not be developed. As development and the creation of coal and timber freights was the object of the builders, they decided to stop till arrangements could be made for opening up this 30 miles of wilderness. These arrangements were made in Philadelphia last week by Superintendent Charles K. McDermott, and he authorizes the statement that work will begin in the early spring.

Choctaw, Oklahoma & Gulf.—It is reported that work has been begun on the extension of this line from Fort Reno, Okla., west 80 miles to Arrapahoe. (See this column for Jan. 15.)

Colorado Valley.—It is officially stated that the work of construction on this road is being pushed on as rapidly as possible, and that the company expects shortly to begin building from the southern end. The road is projected to run from Sweetwater, Tex., southeast toward San Antonio and Austin. Irving Wheatcroft, of Sweetwater, is Vice-President and General Manager. (See this column for Nov. 19.)

Columbus, Fulton & Northern.—This road is being organized at Columbus, Miss., to build a line from that city northeast about 240 miles through Fulton, Miss., and Pittsburgh Landing, Tenn., to Nashville. For officers seeanother column.

Duluth & Iron Range.—It is reported that the work of building has been begun on the 18 miles of new track from Waldo, Minn., to Colquet River to replace the old road. The Drake-Stratton Co., of Pittsburgh, Pa., has the contract. Part of the road will be double-tracked, and the heaviest cut will be 45 ft. The company recently increased its capital stock from $3,000,000 to $10,000,000 to make this and other improvements. (See this column for Oct. 22.)

Improvement on the Duluth & Iron Range.

Duluth, Mississippi & Northern—It is stated that this road will build about 15 miles of new road into the lumber district during the Winter.

Florida Construction Co.—This company has been incorporated in Florida with a capital stock of $10,000 to build, equip and operate railroad lines. The incorporators are T. F. McGarry, R. L. Burtsell and Don J. Leathers.

Guadalupe Valley.—The Guadalupe Construction Co. was incorporated in Texas, Dec. 17, with a capital stock of $400,000 to build this proposed line from San Antonio east about 225 miles to Galveston, with a branch north to Temple and another south to Brownsville. It is stated that final surveys will be made at once and actual building begin by Jan. 1. John P. Nelson, of San Antonio, Tex., is General Manager of the construction company.

Gulf, Louisiana & Great Northern.—It is officially stated that the contract for building and equipping this road from Vermilion Bay, on the Gulf of Mexico, north through the state of Louisiana to the state line of Arkansas, has been let to the St. Louis Construction Co., 1101 Chemical Building, St. Louis, Mo., of which company D. P. Alexander is President and George J. Porter Secretary. The work is to commence on the line between Alexander and Arcadia, 126 miles, in January. Of the total line 115 miles has been surveyed, the maximum grade being 1 per cent., and the maximum curvature 3 deg.. At Alexandria, across Red River, a steel bridge will be built with a 300 ft. draw and a total length of 900 ft. for railroad and wagon traffic.

The company states that the total length of the road when completed will be 1,800 miles, with St. Paul, Minn., as its northern terminus. The work on the whole line will be let as fast as the necessary preliminary arrangements can be perfected. Jos J. Waitz, of Atchison, Kan., is President and General Manager, and Charles F. Rock, of St. Joseph, Mo., Secretary. (See this column for Dec. 17.)

Kansas City, Osceola & Southern.—Official confirmation is received that George S. Good & Co., of Lock Haven, Pa., has received the contract for building the proposed extension from Osceola, Mo., southeast 40 miles to Bolivar, to connect with the St. Louis & San Francisco. This work is heavy and will be started at once. The headquarters of the construction company are at Bolivar. (See this column for Nov. 12 and Dec. 10.)

Mississippi River, Hamburg & Western.—A deed of trust has been filed in the office of the County Clerk at Hamburg, Ark., to the Colonial Trust Co., of New York City, to secure the payment of $400,000 of 20-year gold, bearing five per cent. interest, bonds to be used in building and equipping the Eastern Division of this road from Gaines Landing, on the Missouri River, west to Hamburg, 46 miles. (See this column for Sept 3.) The state has given a grant to this company of 1,000 acres for each mile of railroad built in Ashley and Chicot counties. It is stated that the work is to be begun soon and to be completed about April 30 next.

Mobile & Ohio.—It is reported that construction trains are running from Columbus to the west bank of the Warrior River on the extension of this road from Columbus southeast 168 miles to Montgomery, Ala. The bridge work at Montgomery has made rapid progress, and the superstructure is about to be begun. Work on the buildings at Montgomery will be taken up as soon as the grade at Molton and Catoma streets in the city is completed. (See this column for Nov. 5.)

Ohio River.—This company, in pursuit of the policy it has been following the past two years, is practically reconstructing its roadbed between Parkersburg and Huntington, W. Va. Wherever practicable, trestles are being filled in, sharp curves eliminated, and wooden bridges and culverts replaced with stone and steel. There are two steam shovels and two full crews at work filling in three long trestles between Mustapha and Harris Ferry, at the same time cutting away a long point between the two stations that has necessitated a sharp curve. The bridge force is working on three new bridges between Parkersburg and Ravenswood.

Potosi & Rio Verde Construction Co., Mexico.—This company has been incorporated in New Jersey with a capital stock of $10,000 to build and operate railroads in Mexico. The incorporators are Geo. F. Peabody, Brooklyn, N. Y.; Henry B. Closson, of Orange, N. J.; Charles J. Nourse, Jr., of New York, and Robert S. Towne, of Kansas City, Mo.

Richmond, Petersburgh & Carolina.—Nearly all the grading has been completed on the section between Petersburgh, W. Va., and Ridgeway, N. C., 38 miles, and only about one mile remains to be graded at a point about 20 miles below Petersburgh, where the road is to cross the Roanoake River. Work is now in progress on the bridge over the river. The company expects to have the section of 38 miles completed and equipped by March 1, using 68-lb. rails. All the work so far has been done by the company, but contracts will be let for the heavier work. Gen. James S. Negley, 136 Liberty St., New York, is President.

Southern.—It is officially stated that about four miles has been graded of the extension of the North Carolina Midland Division from Mocksville, N. C., northeast 28 miles to Mooresville on the Charlotte & Taylorsville Division. About 500 men and 200 teams are now at work. T. B. Jones & Co., of Baltimore, Md., has the general contract. The sub-contractors are J. D. Pruden, Watkins & Hardway, of Mocksville; Batchelor & McGouden, J. C. Moore, Gibbs & Hemphill, J. J. Condon, Neal & Pierce, Cleveland, N. C; Carpenlio Bros., Vanpah & Co., Mooresville.

Uniontown, Waynesburg & West Virginia.—This company was incorporated in Pennsylvania, Dec. 23, with a capital stock of $1,000,000 to build a line from Uniontown, a point on the Baltimore & Ohio, west about 50 miles through Waynesburg to the Forks of Union Creek. The incorporators are: W. H. Daly, President; Jonathan Barrett, F. Protzman, Sr., Bernard C. Fauth, Wm. W. C. Jones, B. E. Wheety, Frederick Kennel, S. Linton Rosebury, Wm. K. Codville, W. R. Miller, Edwin F. Tafel, D. S. Orcutt, all of Pittsburgh.

Vining & Coleman.—It is officially stated that this road has been located and cross-sectioned, and the company expects to begin grading early next year. The work will be easy, the maximum grade being one per cent. and the maximum curves 2 deg. There will be no iron or steel bridges, but one timber bridge 200 ft. long. Contracts have been closed for 22 miles of rails delivered, and for ties; also for grubbing and clearing. The road as projected is to extend from a point on the Gulf, Colorado & Santa Fe, six miles south of Coleman, Tex., southward 20 miles to the Vining mines on the Colorado River. The road is being built by the Vining Coal Co., of Austin, Tex., and the company has permission from the Railroad Commission of Texas to issue $250,000 in bonds. The officers are given in another column.

Webster Springs.—This company has been incorporated in West Virginia, with a capital of $100,000, to build a railroad from Webster Springs, Webster County, W. Va., down Elk Fork of Williams River, to the mouth of Big Run, in the same county, and thence by way of Big Run, and a northerly route to a connection with the West Virginia & Pittsburg Railroad, at or near the mouth of Laurel Creek, of McAvey Run, about 30 miles. The road is to be built to open an all-rail route to the Webster Springs, a health resort, and to develop the coal and timber resources of Webster County. The incorporators are: Senator Johnson N. Camden, Meyer Newberger, G. L. Watson, and W. N. Miller, of Parkersburg, W. Va.; Wesley Mulhollan, of Charleston, W. Va.; and Nathan Bushnell, of New York. The principal office of the company will be at Parkersburg, W. Va.

Wheeling & Connellsville.—The incorporation last week of the Uniontown, Waynesburg & West Virginia Railroad has led the projectors of the Wheeling & Connellsville, chartered several years ago to build a road from Wheeling, W. Va., to the Pennsylvania state line, to begin a movement toward the early consummation of their plans. A meeting of stockholders is to be held this week to revive the charter and enter into negotiations with the Pennsylvania corporation. The road is designed to be a coke carrier between Connellsville and the Wheeling iron manufacturing district.

Electric Railroad Construction.

Amherstburg, Ont.—Mr. Joseph De Gurse, C. E., it is reported, is making estimates for grading, bridges, culverts, etc., for an electric railroad from Amherstburg to Windsor and Harrow.

Berlin, Ont.—The Galt & Preston Electric Railway will probably be extended to Berlin.

Brooklyn, N. Y.—Articles of incorporation of the United Railroad Company, of Brooklyn, were filed on Monday of this week. The capital stock is $300,000, made up of shares of $100 each. Under the charter of the original company, of which this is a reorganization, the company is authorized to build a road in Brooklyn between Fulton Ferry and Evergreen Cemetery on Fulton, Washington, Navy and other streets and avenues. The Directors are: Henry C. Barrow, John M. Ward, R. B. Smith, Henry Wyse and Walter F. Downs, of Brooklyn; H. C. Evans, J. C. Farvey, C. M. Bates and F. W. Bruckle, of New York.

Catoctin, Md.—Surveys have been completed for the Catoctin & Myersville electric road, and it is understood that the directors propose to begin building at an early date.

Charleston, S. C.—The Charleston & Seashore Railroad Co. is a new company reported organized to build an electric road to Long Island, a summer resort.

East St. Louis, Ill.—The St. Louis, Bellville & Suburban Railroad which is building between East St. Louis and Bellville, will continue on its work all winter and hopes to get into operation May 1. They are now receiving bids on machinery, contracts for all other materials having been let. This company also has an office at 1110 Ft. Dearborn Building, Chicago.

Key Port, N. J.—The Monmouth Traction Co. has been incorporated to build and operate an electric railroad. Among the incorporators are: Edward Morrell, of Tennessee; Henry V. Massey, of Philadelphia; M. B. Perkins, Beverly, N. J; Alfred B. Stoney, Keyport, N. J. Capital stock, $1,000,000, $25,000 paid in. It is reported that this company will purchase the Matteawan & Key Port Street Railway.

Indianapolis, Ind.—The Elkhart, Goshen & Southern Railway Co. has been incorporated to build an electric road connecting the cities of Goshen, Elkhart and Lake Waninshee. Capital stock, $250,000.

Kingston, Ont.—The promoters of the Kingston & Smith's Falls Railroad will ask for a new charter with power to build an electric road between Kingston and Ottawa.

Lansing, Mich.—The Lansing, St. Johns & St. Louis Railway Co. it is reported, has been organized with a capital stock of $250,000, of which $25,000 is paid in. The entire distance for which the company has obtained a charter covers 55 miles. The directors are: M. V. Montgomery, Lansing, President; I. Hewitt, Maple Rapids, Vice-President; F. L. Dodge, Lansing, Secretary; A. B. Darragh, St. Louis, Treasurer.

Lewiston, Me.—The Lewiston, Brunswick & Bath Electric Railroad Co. has been organized to build an electric railroad next spring between Lewiston and

Bath. The officers are: A. M. Shaw, President, Bath; A. F. Gerald Vice-President and General Manager, Fairfield; Elias Miliken, Treasurer, Augusta,

The Lewiston & Auburn Horse Railroad Co. contemplates building an electric road to Auburn and adjacent towns. H. W. True, General Manager.

Mt. Clemens, Mich.—The Detroit River & St. Clair Railroad Co., which is building an electric line between Mt. Clemens and Marine City, is now laying the rails from Chesterfield to New Baltimore. Ties have been laid to Marine City and the grading completed to that place. It is expected to have six cars placed in operation before Feb. 1, over a part of the road.

Oneonta, N. Y.—The contract for building the Oneonta & Otego Valley Railroad Company's car house and power station, has been let to Andrew Douglas, of Binghamton.

Piermont, N. Y.—It is reported that A. B. Wilgus, representing the Nyack Traction Co., has petitioned the Board of Trustees to run an electric road through this village.

Rutland, Vt.—It is reported that a new electric railroad will be built to operate in Rutland County and Messrs. J. J. Flynn and J. S. Pierson are mentioned in connection with the movement.

Saco, Me.—We are authoritatively informed concerning the Saco River Electric Railroad Co. that Francis A. Hobart, 4½ Beacon street, Boston, is chiefly interested and will have the letting of the contracts. George Hayward, at same address, is the engineer. The road has been entirely surveyed and building will commence in the spring. Contracts for grading, track laying, bridges and other work will be let soon by Mr. Hobart.

St. Catherines, Ont.—A company is being formed and plans matured for building an electric road between St. Catherines and Port Dalhousie, to be completed by April next. H. D. Symmes, manager of the St. Catharines and Thorold electric road, is at the head of the new company.

Southfield (S. I.), N. Y.—The New York Beach Railroad Co. has been incorporated to build in this town a railroad 5 miles long. The directors are: Albert Reynand, Newdorp, Staten Island; Ernest G. Wightman, Stapleton, and Charles N. Harris, 35 Nassau street, New York.

Sycamore, Ill.—It is stated that the Geneva Lake, Sycamore & Southern Electric Railway Co. has been incorporated, and will build a line from the south shore of Geneva Lake, Walworth County, to Morris by way of Hebron, Woodstock, Meringo, Genoa, Sycamore, Cortland and Hinckley. The directors are said to be John B. Whalen, James Brenan, George Brown and George B. Morris, of Sycamore; Amos K. Bunker, J. R. Kellogg and Emil Arnold, of Woodstock.

Topeka, Kan.—A charter has been filed for the Kansas City, Lawrence & Topeka Electric Railway & Power Co., the capital stock of which is said to be $3,000,000. It is the intention of the company to build an electric road for both freight and passenger traffic, the plan being to use the water power from two dams, one at Lawrence and one near Holliday. The Directors are J. C. Johnson, Houston, Tex.; E E. Holmes and James Haggart, of Kansas City, Mo.; Henry McGrew, W. I. Wood and F. N. Gossett, of Kansas City, Kan., and F. B. Purcell, of Manhattan.

Waltham, Mass.—The Newton Street Railway Co. has asked for certain extensions of its line on Beacon and Lexington streets to the Lexington line, which seems to be a move to head off the proposed Lexington Street Railway Co. E. W. Burdett, of Boston, is counsel for the Lexington Street Railway Co.

Whitehall, N. Y.—The Whitehall & Granville Railroad is to be an electric line built for both passenger and freight service. As projected it will run from Whitehall through the villages of North Granville, Truthville, Middle Granville and Granville to West Pawlet, Vt. The total length is 22 miles and the estimated cost $280,000. G. S. Leavenworth, of Cincinnatus, N. Y., is the engineer.

Whitinsville, Mass.—The Blackstone Valley Railway Co. has begun the extension of its line from Palmsville to Northbridge, and will petition the Northbridge authorities for permission to extend the line into Whitinsville.

Zanesville, O.—The Zanesville Street Railway & Electric Co., it is reported, has been placed in the hands of a receiver.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The earnings for the month of November and the five months ended November 30 were as follows:

November:	1897.	1896.	Inc. or Dec.
Gross earn	$3,889,247	$3,187,885	I. $701 361
Oper. expen	2,515,583	2,156,250	I. 359,333
Net earn	$1,373,664	$1,031,635	I. $342,028
Fixed charges	146,507	172,935	D. 26,628
Inc. from operation	$1,227,355	$858,700	I. $568,656
Five months:			
Gross earn	$16.816.651	$14,445.020	I. $2 371,630
Oper. expen	11,703,642	10 072 325	I. 1,631.317
Net earn	$5.113.009	$4,372.695	I. $740.313
Fixed charges	711,908	871.835	D. 159.928
Inc. from operation	$4,401.101	$3,500,860	I. $900,241

Baltimore & Ohio.—The earnings for the month of September were reported as follows:

September:		
Receipts—		
Balance on hand Sept. 1		$494,283
Miscellaneous receipts		268.373
Traffic receipts		2,788,895
Total		$3,551,551
Disbursements—		
Traffic	$472,695	
Miscellaneous	2 544,937	
		3,017.633
Balance Sept. 30		$533,917
Receiver's certificates—		
Balance series No. 1, Sept. 1		$17,583
Expenditures		49
Balance Sept. 30		$17,533
Balance—Series No. 2 (Maryland Construction Company) Sept. 1		$106,627
Balance—Series No. 3 (Pittsburgh & Connellsville Railroad), Sept. 1		496,708
Expenditures		31,279
Balance, Sept. 30		$465,428
Terminal improvement fund—		
Balance Sept. 1		$362,062
Expenditures		29,179
Balance Sept. 30		$332 882

The officers of Baltimore & Ohio give notice that they will make payments of interest on Jan 1, as follows: In New York, at the office of Vermilye & Co., interest on the Pittsburgh & Connellsville first mortgage 1898 extended four per cent. bonds, $2,581 000, amounting to $51,620; at the office of the Mercantile Trust Company, interest on the Baltimore & Ohio car trust bonds 1896, $3,400,000, amounting to $102,000; in Baltimore, at the office of the Baltimore Trust & Guaranty Company, interest on the Pittsburgh & Connellsville certificates, $650,000, amounting to $16,250; at the treasury department of the Baltimore & Ohio Railroad, interest on the Westchester & Potomac first mortgage bonds, amounting to $4.417, and the dividend on the Winchester & Strasburg stock amounting to $1,492.

The earnings being insufficient, the interest upon the following securities will not be paid: Due in London at the office of J. S. Morgan & Co., interest on the Pittsburgh & Connellsville sterling loan, due in 1926, for £1,357,000 at $4.89, amounting to $199,071; due in New York at the Union Trust Company, interest on the Sandusky, Mansfield & Newark Consolidated mortgage bonds, $67,585; at the Farmers' Loan & Trust Company, interest on the Columbus & Cincinnati Midland bonds, $2,000,000, amounting to $45.000; due in Baltimore at the treasury department of the Baltimore & Ohio Railroad, dividends on the Columbus & Cincinnati Midland preferred stock, $15,000,

Holders of consolidated mortgage five per cent. gold bonds, due 1898, are notified that they must be deposited with J. P. Morgan & Co., of New York, prior to Jan. 2, 1898.

Central of Georgia.—The earnings for the month of November and the five months ended November 30 were as follows:

November:	1897.	1896.	Inc.
Gross earn	$604,278	$519,475	$84,803
Oper. expen	327,095	304.033	23,063
Net earn	$277,183	$215,442	$61,740
Five months:	$2,463.560		
Gross earn	1,510,170	$2,344,431	$119,129
Oper. expen	$958,390	1,483,493	26,678
Net earn		$860,938	$92,451

Central of New Jersey.—The earnings for the month of November and the 11 months ended Nov. 30 were reported as follows:

November:	1897.	1896.	Inc. or Dec
Gross earn	$1,154,650	$1,148,620	I. $6,029
Oper. expen	659,048	647,464	I. 11,584
Net earn	$495,601	$501,156	D. $5.554
Eleven Months:			
Gross earn	$11,635,164	$11,634,352	I. $812
Oper. expen	7,122,312	7,268,697	D. 146,385
Net earn	$4,512,852	$4,365,655	I. $147,157

Central Ohio.—Representatives of this leased line of the Baltimore & Ohio began suit at Columbus, O., Dec. 27, to restrain Oscar G. Murray and John K. Cowen, receivers of the Baltimore & Ohio, from interfering with the management of the Central Ohio. The petition is signed by representatives of 2,348 shares of common and 851 shares of preferred stock. Under the agreement between the companies the Central Ohio was to receive 35 per cent. of the gross receipts, and it is claimed that $713,228 was due before the road went into the hands of the Receivers, and that $560,000 has become due since.

Central Vermont.—Holders of six per cent. equipment bonds are notified that 25 of these have been drawn for payment with accrued interest to Jan. 1, at the office of the United States Mortgage & Trust Co., of New York.

Chesapeake & Ohio.—The earnings for the month of November and the five months ended Nov. 30 were reported as follows:

November:	1897.	1896.	Inc.
Gross earn	$1,007,505	$875,035	$132,470
Oper. expen	676,159	577.878	98,281
Net earn	$331,346	$297.157	$34,189
Five months:			
Gross earn	$4,969,964	$4,339,711	$570,253
Oper expen	2,904,505	2,553,664	350,841
Net earn	$2,065,459	$1,786,047	$219,412

It is reported that more than $2,000.000 of the general mortgage 4½ per cent. bonds of the Chesapeake & Ohio have been sold to Redmond, Kerr & Co., and that the proceeds will be used in paying off the $2,287,000 six per cent. purchase money funding bonds, which will mature July 1, 1898.

Chicago & Northwestern.—The gross earnings for the month of November were $3,204,711, an increase of $725,877 over the same month last year. For the six months ended the gross earnings were $19,376,680, an increase of $2,215,898 over the same time last year.

Chicago & Southeastern.—Judge McGregor, at Brazil, Ind., Dec. 20, discharged W. O. Darnell as Receiver for this road, after Henry Crawford, Jr., its President, had settled all claims against the road. Mr. Darnell was appointed about six weeks ago. (See this column for Nov. 19.) The road extends from Anderson, Ind., to Waveland Junction, 81 miles, with a branch 18 miles from Sand Creek to Brazil.

Chicago, Burlington & Quincy.—The earnings for the month of November and the five months ended Nov. 30 were reported as follows:

November:	1897.	1896.	Inc.
Gross earn	$3,803,298	$2 8 3,310	$979,988
Oper. expen	2,332,909	1,682,710	650,199
Net earn	$1,470,389	$1,140,600	$329.789
Fixed charges	890,000	876,202	13 798
Surplus	$580,389	$264,398	$315 991
Five months:			
Gross earn	$19,471,863	$15,629.585	$3,842.578
Oper. expen	11,172,118	8,936,555	2,235,563
Net earn	$8,299,745	$6.692,731	$1,607,015
Fixed charges	4,450,000	4 381.009	68,991
Surplus	$3,849,745	$2,311,721	$1,538,024

Chicago, Milwaukee & St. Paul.—The earnings for the month of November and the five months ended Nov. 30 were reported as follows:

November:	1897.	1896.	Increase.
Gross earn	$3,3 8,446	$2,738,520	$ 89,9 6
Oper. expen	1,858,029	1,482 891	375,138
Net earn	$1,470,416	$1,255,629	$214,787
Five months:			
Gross earn	$15,613,198	$14 167,405	$1,445,793
Oper. expen	9,334,6 7	8,623,536	711,190
Net earn	$6,278,571	$5,543,868	$734,703

Colorado Midland.—Funds have been deposited with the Central Trust Co. to pay the January coupon of the new mortgage bonds as soon as the securities are issued, which will be about Feb. 1. The drawn equipment bonds, series B, and the coupons of these bonds due Jan. 1, will be paid at the office of the Central Trust Co.

Columbus, Sandusky & Hocking.—The old injunction suit against David L. Sleeper, Morris H. Donahue, Herbery B. Butler, George W. Saul, Elias M. Poston, Samuel J. Flickenger, and Anne M. Bonebrake was dismissed by Judge Badger at Columbus, O., Dec. 20. This suit was brought by Directors, who claimed damages for placing the road in the hands of a receiver, as detailed in this column Feb. 5. The road was in the hands of a receiver for about a week, the property being restored to the Directors Jan. 26. Judge Badger has dismissed the petition on the ground that since bringing this injunction suit the company's property has been placed in the hands of a receiver, and there is nothing left of the case.

Excelsior Springs.—This road was publicly sold by Special Master H. F. Simrall, at Liberty, Mo., Dec. 20, to E. L. Morse, one of the bondholders, for $30,000. (See this column for Dec. 17.) The road is to be recognized under the name of Kansas City, Excelsior Springs & Northern. It extends from Excelsior Springs, Mo., to Excelsior Springs Junction, a point on the Wabash, 9.47 miles.

Kansas Central.—Holders of first mortgage bonds are notified that there is due and payable on each the sum of $40.62, of which $18.79 is due upon the bond and 72 cents upon each coupon. Payment will be made at the office of the Receivers, 27 William street, New York. Coupons not presented before Jan. 21, 1898, will cease to draw interest from that date.

Kansas City, Fort Scott & Memphis.—This company has sold to a Boston syndicate $500,000 of 6 per cent. bonds at about 98, to retire a like issue of Kansas City, Springfield & Memphis 6 per cent. bonds which matured May 1, 1894. These bonds came due when the securities of the company were greatly depreciated, and were carried along until the increased traffic has made it possible to effect their retirement.

Kansas Pacific.—The dates of the foreclosure sales and the upset prices of the various properties of this company, whose sale was recently deferred, as stated in this column two weeks ago, are as follows:

Moregage.	Date of sale.	Place of sale.	Upset price.	Depost requ'r'd.
Kansas Pacific, Gov. sub	Feb. 16	Topeka	$2,500,000	$500,000
Kansas Pacific, East Div	Feb. 17	Topeka	4,500,0.0	200,000
Kansas Pacific, Mid. Div	Feb. 18	Salina	5,3?0,000	250,000
Kansas Pacific, Con.	Feb. 19	Topeka	8.000,000	500,000
Denver Pacific, 1st	Feb. 21	Denver	2.000 000	500,000

Lake Shore & Michigan Southern.—The estimated earnings for the year ended Dec. 31 were reported as follows:

Year:	1897.	1896.	Inc. or Dec.
Gross earn	$20.223,013	$20,191 957	I. $99.056
Oper. expen	13,486 585	13,726,154	D. 239,569
Net earn	$6.8 6,428	$6 467,863	I. $338,625
Fixed charges	3 (60,000	3,415,403	D. 385,403
Balance	$3,746 428	$3,022,460	I. $724,028
Dividend	2,967 990	2,967.990	
Surplus	$778,438	$54,410	I. $724,028

Louisville & Southeastern.—This company was incorporated in Kentucky, Dec. 23, with a capital stock of $5,000,000, as the successor to the Richmond, Nicholasville, Irvine & Beattyville, recently purchased by Adolph Segal, of Philadelphia. (See this column for Dec. 3.) The road extends from Versailles, Ky., to Irvine, 61 miles, and it is proposed to make an addition of 32 miles from Irvine to Beattyville, for which an issue of $2,500,000 bonds will be made. Mr. Segal retains $1,200,000 of the capital stock.

Louisville, Evansville & St. Louis.—At a recent conference, held in New York, between the first mortgage bondholders and the Consolidated bondholders the various interests failed to come to an agreement, and the first mortgage bondholders have instructed their attorneys to bring suit to foreclose their mortgage at once. The first mortgage bonds ($2,000,000 outstanding) cover 180 4 miles of the road, and the Consolidated bonds ($3,797,500 outstanding) cover 65.5 miles, Mount Vernon, Ill., being the dividing point.

Manhattan, Alma & Burlingame.—A decree of foreclosure was entered against this road Dec. 21 on application of Oliver W. Mink and Samuel Thorndykes trustees, the indebtedness being $1,380,540. Hiram P. Dillon was appointed Master for the sale of the property. The stock and bonds are held equally by the stockholders of the Atchison, Topeka & Santa Fe and the Union Pacific. The road extends from Manhattan, Kan., to Burlingame, 56.62 miles.

Memphis & Charleston—At a meeting of the holders of Central Trust Company certificates, representing the seven per cent. bonds, the general mortgage six per cent. bonds and stock, the plan of settlement effected by the Borg Committee was confirmed as follows (see this column for Dec. 17):

Under the terms of said settlement, the Central Trust Company, upon surrender of its certificates, will pay in cash the sum of $650 for each $1,000 of said General Mortgage Bonds represented thereby, with all unpaid coupons attached.

Holders of Central Trust Company receipts for seven per cent. bonds (or for Guarantee Trust Company certificates representing such bonds) upon surrender of their receipts to the Central Trust Co. may have the option under said settlement with the Southern Railway Company.

(1) To participate under the plan of the committee of which Mr. Adrian Iselin, Jr., is Chairman, as modified by the notice this day published by the Committee; or

(2) at any time after Jan. 1, and before Jan. 15, 1898, to receive par and accrued interest for their bonds and coupons, together with interest at the rate of six per cent. per annum on all unpaid matured coupons, less the amount which has been heretofore paid (with interest at the rate of six per cent. from the date of payment) on account of said coupons.

Upon surrender of its certificates for stock deposited, the Central Trust Company will return said stock to the respective owners and refund in cash the amount of the assessment paid thereon, together with a further sum of five per cent. of the par value of each share of stock so returned.

The Iselin Committee, representing the Tennessee lien bonds, second mortgage extended bonds, first and second mortgage extended bonds, consolidated seven per cent. bonds, and the general six per cent. bonds, has come to an agreement with the Southern Railroad Company: That in completion of reorganization, that company will purchase the property from the committee, and will give its own direct divisional bonds, secured by first mortgage on this division, instead of the first mortgage bonds proposed to be issued in the plan, and will deliver its preferred stock in lieu of the income bonds or preferred stock of the new company, as proposed to be issued under the plan; such divisional first mortgage bonds in each instance to be issued in substitution for, and in lieu of, an equal amount of first mortgage bonds of the new company, and such Southern Railway preferred stock to the par amount of $400 to be issued in substitution for, and in lieu of, the $400 of income allotted under the plan to each Tennessee lien, first mortgage, or second mortgage extended bond; and such Southern Railway preferred stock to the par amount of $1,600, to be issued in substitution for, and in lieu of, $1,200 of incomes allotted under the plan to each of the 864 consolidated bonds.

In pursuance of the contract above mentioned, and as condition thereof, the Southern Railway Company has acquired all of the general mortgage six per cent. bonds, held by the committee of which Simon Borg is Chairman, and proposes to deposit the same under the said plan of March 5, 1896, thereby insuring the accomplishment of said plan as now modified.

The holders of certificates for general mortgage bonds heretofore deposited, will be entitled, in completion of reorganization, to receive $2,000 Southern Railway preferred stock in lieu and instead of income bonds of preferred stock of the new company, as proposed in said plan.

New York Central & Hudson River.—Judge Lacombe, of the United States Circuit Court for the Southern District of New York, on Dec. 24 heard an application made on behalf of Charles De Neufville for an injunction to restrain the issue of bonds by the New York Central & Hudson River under the $100,000,000 refunding mortgage adopted last summer. Mr. De Neufville is a stockholder in the old New York & Northern, now the New York & Putnam, which was sold to the New York Central & Hudson River some months ago. The claim made is that this sale has never been legally consummated.

Northern Central.—The earnings for the month of November and the 11 months ended Nov. 30 were as follows:

November:	1897.	1896.	Inc. or Dec.
Gross earn.	$615,186	$551,897	I. $63,289
Oper. expen.	412,338	382,253	I. 30,085
Net earn.	$202,848	$169,644	I. $33,204
Eleven months:			
Gross earn.	$6,146,263	$5,766,482	I. $379,781
Oper. expen.	4,243,625	4,248,275	D. 4,650
Net earn.	$1,902,638	$1,518,207	I. $384,431

Northern Pacific.—The earnings for the months of October and November and the five months ended Nov. 30 were reported as follows:

October:	1897.	1896.	Inc. or Dec.
Gross earn.	$2,784 755	$2,498,834	I. $285,921
Oper. expen.	1,189,061	1,065,192	I. 93,869
Net earn.	$1,625,694	$1,433,642	I. $192,052
Taxes	42,900	49,259	D. 6,359
Net oper. income	$1 582.794	$1,384,383	I. $198 411
Other income	30,075	14,431	I. 15,644
Total net	$1,612,869	$1.398,814	I. $214,055
November:			
Gross earn.	$2,610,483	$1,682,394	I. $958 089
Oper. expen.	1,017.644	935,212	I. 82,432
Net earn.	$1,592,838	$747,182	I. $875,656
Five months:			
Gross earn.			$11,604,998
Oper. expen.			5,410,174
Net earn.			$6,194,824
Fixed charges			214.500
Balance			$5,980,324

Omaha Bridge Co.—Holder of first mortgage bonds are notified that four bonds, called for redemption April 1, 1894, are still outstanding. These will be paid at the office of J. P. Morgan & Co, New York, or at the London & San Francisco Bank, London, on and after Jan. 1 next, at 110 per cent. with interest to date.

Omaha, Kansas City & Eastern.—At a meeting of the stockholders, held in Kansas City, Mo, Dec. 23, it was voted to increase the capital stock from $1,500,000 to $2,000,000. It was further decided to issue first mortgage bonds at the rate of $20,000 per mile, and second mortgage bonds at the rate of $15,000 per mile; these issues to be used for further improvements on the road.

Pennsylvania Co.—Holders of Philadelphia, Wilmington & Baltimore trust certificates are notified that $165,285 has been set aside for the purchase of as many of these certificates as are offered at the lowest price not exceeding par before Dec. 31, at the company's office, Philadelphia.

Philadelphia & Reading.—The earnings for the month of November and the year ended November 30 were as follows:

November:	1897.	1896.	Inc. or Dec.
Railway Company—			
Gross earn.	$1,924,717	$2,003,801	D. $79,084
Oper. expen.	992,307	1,022,524	D. 30 217
Net earn.	$932,410	$981,277	D. $48,767
Coal & Iron Company—			
Gross earn.	$2.227.058	$2,030,038	I. $190,120
Oper. expen.	2,109,496	1,784,800	I. 324,696
Net earn.	$117,562	$245,238	D. $127,676
Reading Company—			
Net income	37,200	37,200	
Net earn. of all companies	$1,087,173	$1,263,716	D. $176,543
Year:			
Railway Company—			
Gross earn.	$9,938 578	$9 478.321	I. $460,257
Oper. expan.	5 251,046	5,123,141	I. 1.7 905
Net earn.	$4,687,532	$4,355,180	I. $332,352
Coal & Iron Company—			
Gross earn.	$11,357,894	$10,590,730	I. $767,164
Oper expen.	10,620,260	9,847,322	I. 772,938
Net earn.	$737,634	$743,408	D. $5,774
Reading Company—			
Net income	157,040	157,040	
Net earn. of all companies.	$5,582,208	$5,255,629	I. $326,579

Rio Grand Western.—The Auditor's figures of the earnings for the five months ended Nov. 30 were as follows:

Gross earn	$1,523,583
Oper. expen	930,828
Net earn	$592,755
Surplus above all charges	$287,885

St. Louis & San Francisco.—The earnings for the month of November and the five months ended Nov. 30 were reported as follows:

November:	1897.	1896.	Inc.
Gross earn.	$612,568	$517,660	$94,908
Oper. expen.	242,734	281,128	61,606
Net earn.	$269,834	$236,532	$33,302
Five months:			
Gross earn.	$3,0 6,032	$2,625,464	$440,568
Oper. expen.	1,666,679	1,412,755	253,924
Net earn.	$1,399,353	$1,212,709	$186,644

Sandusky, Mansfield & Newark.—At the request of the majority of holders of first mortgage seven per cent. bonds, John Gardiner, J. O. Moss, Charles C. Deming, Arthur P. Sturgess and W. C. Osborn have consented to act as a committee for their protection. Holders of these bonds are requested to deposit them with the Union Trust Company, of New York. (See this column for Dec. 17.)

Sebasticook & Moosehead.—H. W. Martin, of New York, who holds $50,000 of second mortgage bonds, has foreclosed on his mortgage and taken possession of the road and equipment, placing it in the hands of G. M. Crawford and E. L. Van Etten, of Wiscassett, Me. This road extends from Pittsfield, Me., to Hartland, eight miles.

Southern.—The earnings for the month of November and the five months ended Nov. 30 were as follows:

November:	1897.	1896.	Increase.
Gross earn.	$1,851,705	$1,684,178	$167,527
Oper. expen.	1,190,367	1,061,690	128,677
Net earn.	$661,338	$622,188	$38,850
Five months:			
Gross earn.	$8,657,713	$8,138,794	$518,918
Oper. expen.	5,797,688	5,422,723	374,965
Net earn.	$2,860,025	$2,716,071	$143,953

Tacoma & Columbia River.—This company has issued a mortgage for $3,000,000 to the Continental Trust Co. as trustee, to secure five per cent. gold bonds, of which $250,000 have been issued on the 12½ miles from Tacoma, Wash., to Lake Park. Of the remaining issue, $250,000 is to be used for deep water connection, and the rest at $20,000 per mile for extensions. This company is successor to the Tacoma, Lake Park & Columbia, foreclosed last October. (See this column for Nov. 5 and 26.)

Western Maryland.—The earnings for the year ended Sept. 20 were reported as follows:

Year:	1897.	1896.	Inc or Dec.
Gross earn.	$1,251,238	$1,265,689	D. $14,451
Oper. expen.	816,330	845,176	D. 28,846
Net earn	$434,908	$420,513	I. $14,395

The company expended during the year $51,025 for equipment, betterment and construction.

Wisconsin Central.—Judge Jenkins, of the United States Circuit Court, at Milwaukee, Wis, has issued a decree of foreclosure in favor of John A. Stewart and Edwin H. Abbott, as Trustees, for $12,000,000, the amount of the first mortgage bonds, unpaid interest coupons $1,800,000, and interest on the deferred interest payments since July 1, 1894, the total amount being $14,309,125. F. M. Hoyt is appointed Special Master to ascertain and report whether the franchises and property shall be sold as an entirety, or in two or more separate parcels, and what liens, if any, are superior to the first mortgage. The suit is a step toward reorganization of the company.

On Dec. 22 Judge Jenkins signed two orders authorizing the Wisconsin Central to execute and deliver two agreements made by them with the Milwaukee & Lake Winnebago, and the Chicago, Wisconsin & Minnesota on Dec. 31, 1896. The orders provide that the Court may resume possession of the two companies if they fail within 30 days after a demand is made to pay their receivers or successors all sums due. The rental under the new contract is fixed at the actual net earnings, after deducting in addition the just proportion of taxes, equipment charges and improvements. This is instead of the fixed percentage of the gross earnings as formerly.

Electric Railroad News.

Harrisburg, Pa.—Officers of the Harrisburg & Mechanicsburg Electric Railway say that the injunction suit instituted by the Philadelphia & Reading, to prevent their company from crossing the other's tracks at Camp Hill will be amicably adjusted and the extension to Mechanicsburg pushed to an early completion.

New York.—The Appellate Division of the Supreme Court on Dec. 19 heard the appeal of the East River & Atlantic Ocean Railroad Co. from Justice Van Wyck's decision, continuing the injunctions which now prevent the Board of Aldermen from passing the franchise of the road over the Mayor's veto. The injunction has been made permanent.

Orange, N. J.—On Dec. 20 the Common Council granted perpetual franchises to the South Orange & Maplewood Traction Co. to cross Main street at grade over the tracts of the Consolidated Traction Co., and to connect with the Erie Railroad.

San Francisco, Cal.—H. E. Huntington was elected President of the Market Street Railway Company, to fill the vacancy caused by the death of Col. C. F. Crocker. Charles Hollbrook was elected Vice-President, to succeed Mr. Huntington.

Shamokin, Pa.—The directors of the Shamokin Street Railway Co. have decided to shut down the road at the end of the present year, claiming that it has proved a losing investment.

Watertown, N. Y.—The Watertown & Brownville Street Railway Co. has filed a certificate of reorganization at Albany, in which it is stated that the road will be reorganized under the name of the Black River Traction Co., with a capital stock of $65,000. Directors are Julius A. Lebekucker, George Trementz, and Chandler W. Riker, of Newark, N. J.; B. Van Wagener, of South Orange, N. J.; H. I. Inglehart and George H. Waller, of Watertown.

TRAFFIC.

Traffic Notes.

The Louisville & Nashville has just completed at Pensacola, Fla., a grain elevator of 500,000 bu. capacity.

The Sunset Limited express of the Southern Pacific will continue to run to and from Chicago twice a week, and, in addition, there will be a "Sunset Limited annex" from New Orleans to El Paso to connect with it.

Judge Dale, at Wichita, Kan., has given judgment against the Atchison, Topeka & Santa Fe for refusing to give a stock shipper a return pass. A law of Kansas, lately enacted, requires railroads to give stock shippers passes both ways.

The *Atlanta Constitution* reports that at a meeting in that city last week the Southern Railway and the Seaboard Air Line reached an agreement by which the Seaboard will sell through tickets over its main line on the basis of about $3 less than the fare by the Southern; but no official details are given out.

The Secretary of Agriculture has issued a circular to railroads notifying them of regulations governing the transportation of cattle from Texas and certain other Southwestern states between Jan. 15 and Nov. 15. These regulations are to guard against the spread of splenetic fever. Secretary Wilson, besides defining the quarantine line fixed by his department, accepts the lines established by the various states.

The Managers of the Joint Traffic Association have reduced the rate on corn to the basis of 17½ cents per 100 lbs. Chicago to New York, and the rate on all other grain to the basis of 20 cents. The Board of Control of the Association held conferences several days last week and this change appears to be the result of those conferences. The report of the doings of the Board of Control, as given to the newspapers, expresses the belief that rates will be restored on Jan. 1 and thereafter maintained, but the present demoralization is great and widespread and a good many railroad officers seem to think that the official "belief" concerning restoration has but a slight basis of fact. The reporters seem to feel sure, from what they learn at Chicago, that large contracts, running at least one month longer, are still in force.

The merchants of Denver will establish a traffic bureau on Jan. 1 and will try to convince the railroads that raw material ought to be brought to that city at cheaper rates so as to encourage the establishment there of factories. Just at present there would seem to be little work for a bureau to do, as the wholesale merchants are rushing in freight by the dozen carloads to take advantage of the very low rates from the East which will be discontinued at the end of this month. When the notice of restoration of tariffs was given, one firm, it is said, at once ordered 150 carloads of merchandise. Many others are ordering goods in quantities as large as they can get credit for. The warehouse men say that the business will greatly overtax their facilities. It appears that this long continued rate war was finally settled on the basis of 39 cents differential in the rates from the Atlantic Coast as between all-rail and water-and-rail. The Union Pacific, Denver & Gulf demanded a differential of 44 cents the other lines demanded 35, and finally they split the difference.

Chicago Traffic Matters.

CHICAGO, Dec. 29, 1897.

The attitude of the Michigan lines parties to the Central Passenger interchangeable mileage agreement has resulted in a split in that bureau, and the roads referred to have formed what is known as the Northern Mileage Ticket Bureau, with headquarters at Detroit. The roads in this bureau, which it is expected will begin business by Jan. 15, will have an interchangeable ticket which will be good on trains. The roads in the new bureau are the Ann Arbor; Chicago & West Michigan; Detroit, Grand Rapids & Northern; Flint & Pere Marquette; Grand Rapids & Indiana; Lake Shore & Michigan Southern; Manistee & Northeastern; Michigan Central; New York, Chicago & St. Louis, and the Pittsburgh & Lake Erie.

Western traffic officials are taking exception to the action of the Joint Traffic managers in making a rate of 20 cents on grain and 17½ cents on corn from Chicago and Mississippi River points to New York, claiming that it is a disturbance of the regularly established differentials, and a discrimination against this city.

Commissioners Wellington, Courtright and Shute, of the Western Joint Traffic Bureau, who have been in the South and East investigating the export facilities of the various ports, with a view to readjusting all-rail grain rates in order to meet Gulf competition, have returned and are now busy drawing up their report on the subject.

Passenger representatives of the lines running between this city and St. Louis and Kansas City and also between St. Louis and Kansas City, have entered into a new agreement governing passenger business. One of the chief features of the new agreement is the complete withdrawal of a class of tickets that scalpers have found workable. All the roads bind themselves not to pay any commissions on eastbound business and no line can take independent action without first discussing the matter at a joint meeting with the other roads.

The situation in eastbound freight rates does not improve, all manner of cuts being made on all commodities. Further than this not much confidence is expressed that matters will be mended on the first of the year.

The Illinois Central Railway Company has given notice that it will run homeseekers, excursions from points on the western lines to points thereon south of the Ohio River during the first four months of 1898.

Eastbound shipments from Chicago and Chicago junctions to points at and beyond the western termini of the trunk lines for the week ending Dec. 23 amounted to 129,989 tons, as compared with 85,428 tons the preceding week. This statement includes 60,519 tons of grain, 19,866 tons of flour and 18,992 tons of provisions, but not live stock. The following is the statement in detail for the two weeks:

Roads.	Week Ending Dec. 23.		Week Ending Dec. 16.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio	10,765	8.3	3,517	4.
C., C., C. & St. Louis	10 264	7.9	4,109	4 7
Erie	11,086	8.5	7,913	9.
Grand Trunk	7,075	5.5	3,956	4.5
L. S. & M. S.	15,992	12.3	9,936	11.3
Michigan Central	12,847	9.9	7,210	8.2
N. Y., Chi. & St. L.	10,523	8.1	7,943	9.
Pitts., Cin., Chi. & St. Louis.	15.125	11.6	11,958	13 6
Pitts., Ft. Wayne & Chicago	26.536	20.4	16,807	19.
Wabash	9,776	7.5	11,079	12.6
Totals	129,989	100.0	85,428	100.0

Lake shipments last week were 3,080 tons.